C. 1
MAY
86

ELECT. STDS.

DRANETZ®

DRANETZ TECHNOLOGIES, INC.

OPERATING MANUAL

SERIES 626
UNIVERSAL DISTURBANCE ANALYZER

Digitized by the Internet Archive
in 2024

https://archive.org/details/manualsplus_01302

DRANETZ SERIES 626 (UDA) AVAILABLE PLUG-IN MODULES

Note: The Series 626 system is UL listed provided the Mainframe and all plug-ins used are UL listed (as indicated by the listing mark on the products).

Plug-in/PN	UL Status*	Inputs
1ϕ AC Monitor 626-PA-6001	Listed	Line Voltage: 50-600 V ac, 45-60 Hz; Impulse Peak Voltage: 25-4000 V, 1-2000 µS, Opt Impulse Detection.
Low Range DC 626-PA-6002A	Listed	Voltage Level: 0.5-80 V dc; Impulse Peak Voltage: 0.5-80 V, 1-2000 µS.
High Range DC 626-PA-6002C	Listed	Voltage Level: 25-600 V dc; Impulse Peak Voltage: 25-4000 V, 1-2000 µS.
3ϕ AC Monitor 626-PA-6003	Listed	Line Voltage: 50-600 V ac, 45-65 Hz; Impulse Peak Voltage: 25-4000 V, 1-2000 µS.
AC Current Monitor 626-PA-6005	Listed	Full Scale Ranges: 5-300 A rms, 45-65 Hz; Impulse Peak Current: 25-2000 A, 1-2000 µS.
AC Neutral Monitor 626-PA-6006	Listed	Line Voltage: 2-50 V ac, 45-65 Hz; Impulse Peak Voltage: 25-4000 V, 1-2000 µS.
Sequential Events 626-PA-6007	Listed	8 Inputs, Change-of-State Times, 2 V dc (Nominal) Trip Point.
Temp/Humidity 626-PA-6008	Listed	Temperature 0 to 100°C; Relative Humidity: 0 to 100%.
3ϕ 400Hz AC 626-PA-6009	Listed	Line Voltage: 50-600 V ac, 370-450 Hz; Impulse Peak Voltage: 50-4000 V, 1-100 µS.
Event Time Accumulator 626-PA-6011	Listed	8 Inputs, Elapsed and On/Off Times, 2 V dc (Nominal) Trip Point.
Communications and Storage Modules 626-PA-6012A 626-PA-6013	Listed	Accepts Data from Series 626 RS-232C Port; Stored Data (900 Disturbances) Available via Integral Auto-Answer/ Auto-Dial Modem (-6012A) or RS-232C Port (-6013).

(over)

* It is our intention to gain UL listing on all available accessories for the Series 626. In the "UL Status" column, "Listed" indicates the product is UL listed, "Pending" indicates an application for UL listing has been submitted, and "Future" indicates one will be submitted in the near future.

DRANETZ SERIES 626 (UDA) AVAILABLE PLUG-IN MODULES (cont'd)

Plug-in/PN	UL Status	Inputs
8-Channel Temp Monitor 626-PA-6014	Listed	8 Separate Probes: -50 to +150°C.
3-Channel Transducer 626-PA-6015	Listed	0-10 V dc, 0.2% Accuracy, Programmable Full Scale Value and Engineering Units.
Impulse Energy Monitor 626-PA-6018	Listed	Input Ranges: 0-600 V rms, 0-300 A rms, 45-450 Hz; Impulse Peak Voltage: 25-2000 V, 1-1000 µS; Impulse Peak Current: 12-1000 A.
RF Field Strength Monitor 626-PA-6020	Listed	Frequency Response: 1.0 MHz - 1.0 GHz ±6 dB; Field Strength Range: 0.5-8.0 V/M; Response Time: CW to 1 µS.
3Ø AC Voltage Harmonic Analyzer 626-PA-6024A	Future	Line Voltage: 50-600 V ac, 47-63 Hz.
3Ø AC Current Harmonic Analyzer 626-PA-6024B	Future	TR-2019 Current Probe (3); Sync. Voltage: 50-600 V ac, 47-63 Hz.
3Ø AC Monitor 626-PA-6030 & Model 626GP	Future	Line Voltage: 50-600 V ac, 47-63 Hz; Impulse Peak Voltage: 50-4000 V, 1-2000 µS. Graphics Printer graphically displays RS-232C input from -6030.
Remote Interface Adapter 626-PA-6036	Pending	Connects Directly to any RMU; Optional Auto-Dial Modem Available.
1Ø AC Remote Monitor 626-RMU-1	Pending	Line Voltage: 90-140 V ac or 180-250 V ac, 47-63 Hz; Impulse Peak Voltage: 50-2000 V, 1-1000 µS;
3Ø AC, DC Remote Monitor 626-RMU-3	Pending	Line Voltage: 50-320 V ac, 47-63 Hz; Impulse Peak Voltage: 50-2000 V, 1-1000 µS; DC Voltage Level: 1-25 V.
3Ø AC Remote Monitor 626-RMU-3A	Pending	Line Voltage: 50-320 V ac, 47-63 Hz, (Isolated Neut-to-Gnd Monitoring); Impulse Peak Voltage: 50-2000 V, 1-1000 µS.

NOTE **For full specifications, call or write for Bulletin 626.**

DRANETZ
DRANETZ TECHNOLOGIES, INC.
COMPUTER PRODUCTS DIVISION
PO Box 4019, Edison, NJ 08818-4019
TEL: (201) 287-3680/1-800-DRANTEC
TWX: 710-997-9553/CABLE: DRANETZ

626 MF

WARNING

Because of possible shock or fire hazards, connection of this instrument should be performed in compliance with the National Electrical Code (ANSI C1) and/or any other requirements which may be applicable to the user.

Installation, operation and maintenance should be performed only by qualified personnel.

TM-106650U

VOLUME 1

OPERATOR'S MANUAL

SERIES 626 UNIVERSAL DISTURBANCE ANALYZER

MODEL 626

NOTE: Refer to Volume 2 (Service Manual) for maintenance data.

1 May 1984
(Revised 15 August 1985)
(Revised 1 May 1986)

© COPYRIGHT 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. EDISON, NEW JERSEY.
ALL RIGHTS RESERVED.

DRANETZ TECHNOLOGIES, INCORPORATED
1000 New Durham Rd., PO Box 4019, Edison, NJ 08818-4019

NOTICE

This publication contains information proprietary to Dranetz Technologies, Inc. By accepting and using this manual, the user agrees that the information contained herein will be used solely for the purpose of repairing or operating equipment of Dranetz Technologies, Inc. These manuals are to be returned to Dranetz Technologies, Inc. when no longer required by the user or when there is a change in ownership of the equipment.

These publications are protected by the Copyright laws of the United States Title 17 et seq. No part of this publication may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language or computer language, in any form, by any means, electronic, mechanical, magnetic, optical, chemical, manual or otherwise, without the prior written permission of Dranetz Technologies, Inc., 1000 New Durham Road, PO Box 4019, Edison, New Jersey 08818-4019.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

DRANETZ®
Tel. (201) 755-7081
TWX: (710) 997-9553
TELEX: 499-7808
CABLE: DRANETZ

IMPORTANT!

CONTROL Nº 11964 -6

REQUEST TO BECOME A REGISTERED RECIPIENT OF
DRANETZ MODEL 626 (UNIVERSAL DISTURBANCE ANALYZER) VOLUME 2 MANUALS

1. The undersigned company known as the "applicant" applies to obtain a loan of a maintenance (service) manual for the Series 626 equipment listed below.

2. Check the appropriate boxes of the Volume 2 manuals you are requesting. After each box you check, fill in the serial number of your product.

- [X] 626 Mainframe S/N_____ TM-106650U Vol. 2
- [ ] 626-PA-6001 S/N_____ TM-106705U Vol. 2
- [ ] 626-PA-6002A S/N_____ TM-110385-1U Vol. 2
- [ ] 626-PA-6002C S/N_____ TM-110385-3U Vol. 2
- [ ] 626-PA-6003 S/N_____ TM-110235U Vol. 2
- [ ] 626-PA-6005 S/N_____ TM-111805 Vol. 2
- [ ] 626-PA-6006 S/N_____ TM-110390AU Vol. 2
- [ ] 626-PA-6007 S/N_____ TM-110280-1U Vol. 2
- [ ] 626-PA-6008 S/N_____ TM-111025U Vol. 2
- [ ] 626-PA-6009 S/N_____ TM-110650U Vol. 2
- [ ] 626-PA-6011 S/N_____ TM-110280-3U Vol. 2
- [ ] 626-PA-6012A S/N_____ TM-111900 Vol. 2
- [ ] 626-PA-6013 S/N_____ TM-111916 Vol. 2
- [ ] 626-PA-6014 S/N_____ TM-110026U Vol. 2
- [ ] 626-PA-6015 S/N_____ TM-111027U Vol. 2
- [ ] 626-PA-6018 S/N_____ TM-111650 Vol. 2
- [ ] 626-PA-6020 S/N_____ TM-111925 Vol. 2
- [ ] 626-PA-6024A S/N_____ TM-111960-G1 Vol. 2
- [ ] 626-PA-6024B S/N_____ TM-111960-G2 Vol. 2
- [ ] 626-PA-6030 S/N_____ TM-112975 Vol. 2
- [ ] 626GP (115V) S/N_____ TM-113000-G1 Vol. 2
- [ ] 626GP (230V) S/N_____ TM-113000-G2 Vol. 2
- [ ] 626-RMUs; 6030 & Optional Modems S/N_____ S/N_____ TM-111200 Vol. 2 (covers both)
- [ ] New plug-in not listed above: Model_____ S/N_____

(over)

SERVICE MANUAL REQUEST FORM

3. The applicant recognizes that the information contained within the manual is proprietary in nature. The applicant agrees that the information contained in the manual will be used solely for the purpose of repairing equipment of Dranetz Technologies, Inc. which the applicant has purchased from Dranetz. The applicant further agrees that the manual is to be returned to Dranetz when the manual is no longer required by the applicant, or when there is any change in ownership of the equipment.

4. The applicant agrees that the information contained in the manual will not be disclosed by the applicant to any person or entity, except when this disclosure is incidental to the repair of the equipment purchased by the applicant from Dranetz.

5. The applicant further agrees that it will not make any copies or reproductions of this manual, except with the prior written consent of Dranetz Technologies, Inc. In the event that such copies are permitted, the applicant agrees to return all copies or reproductions of the manual together with the original manual when the manual is no longer required, or when there is any change in ownership of the equipment.

6. The applicant recognizes that the loan of the manual is not a license to use the information contained in the manual for any purpose other than the repair of the equipment which the applicant has purchased from Dranetz.

_____
(DATE)

RETURN THIS APPLICATION TO:

DRANETZ SERVICE CORPORATION
Subsidiary of Dranetz Technologies, Inc.
2259 South Clinton Ave., (BLDG 1)
South Plainfield, NJ 07080

_____
(Print name of applicant company)

By_____
(Authorized Signature)

_____
(Print Name)

Title_____

Dept./Div._____

Mailing Addr._____

City_____ State_____ Zip_____

Telephone No._____

This instrument is being used for: ☐ Field Service ☐ Rental
☐ Development Eng. ☐ Facility Eng.
☐ Other _____
(Please Specify)

DRANETZ SERVICE CORPORATION
Subsidiary of Dranetz Technologies, Inc.
2259 SO. CLINTON AVE., BLDG 1
SOUTH PLAINFIELD, N.J. 07080

TEL (201) 755-7081

TWX: (710) 997-9553
TELEX: 499-7808
CABLE: DRANETZ

REPAIR/SERVICE ORDER

NOTE: THIS COMPLETED FORM MUST ACCOMPANY RETURNED EQUIPMENT

CUSTOMER SHIPPING & BILLING INFORMATION

CUSTOMER P.O. # _____ P.O. DATE _____

SHIP TO: _____ INVOICE TO: _____

_____ _____

_____ _____

_____ _____

In Continental U.S., material will be returned by Dranetz to you by UPS, UPS Blue or other carrier chosen by Dranetz unless otherwise designated.

EQUIPMENT BEING RETURNED

Date of Original Purchase: _____ Original P.O. # _____

Model No. _____ S/N _____

Model No. _____ S/N _____

Ancillary equipment also being returned (If you neglect this, these items may not be returned to you).

☐ Power & Other Cables _____ ☐ Instr. Book _____

☐ Plug-ins (incl. S/N) _____ ☐ Connectors _____

☐ Other _____

RETURN AUTHORIZATION

Have you discussed the problem with Dranetz Sales or Service personnel?

Dranetz Return Authorization # _____

By: _____

If so, with whom _____ Date: _____

Whom should the Dranetz Service Corporation contact for technical questions?

_____ ( )

NAME (Print) DEPARTMENT TELEPHONE

DESCRIPTION OF PROBLEM

Reason for return: Defective ☐ Calibration ☐

Please be detailed, explicit and complete. Include test data, if this helps to describe the problem.
IMPORTANT: Repairs cannot be made unless this section is completely filled out.
(Attach added sheets if necessary)

_____

_____

_____

_____

CHECK WHERE APPLICABLE: IS MALFUNCTION RELATED TO: Warmup ☐ Temperature ☐
Intermittency ☐ Mechanical Handling ☐ Visual Defects ☐ Grounding ☐ Test Data Attached ☐

INITIATOR OF THIS ORDER

_____

NAME/TITLE SIGNATURE TELEPHONE

(SEE OTHER SIDE FOR INSTRUCTIONS)

IMPORTANT (SEE OTHER SIDE FOR INSTRUCTIONS)

IMPORTANT (ENCLOSE THIS ENTIRE FORM WITH EQUIPMENT)

NOTICE

This publication contains information proprietary to Dranetz Technologies, Inc. By accepting and using this manual, the user agrees that the information contained herein will be used solely for the purpose of repairing or operating equipment of Dranetz Technologies, Inc. These manuals are to be returned to Dranetz Technologies, Inc. when no longer required by the user or when there is a change in ownership of the equipment.

These publications are protected by the Copyright laws of the United States Title 17 et seq. No part of this publication may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language or computer language, in any form, by any means, electronic, mechanical, magnetic, optical, chemical, manual or otherwise, without the prior written permission of Dranetz Technologies, Inc., 1000 New Durham Road, PO Box 4019, Edison, New Jersey 08818-4019.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

TABLE OF CONTENTS

Section			Page
I	GENERAL INFORMATION		
	1.1	Introduction	1-1
	1.2	Purpose	1-1
	1.3	Features	1-2
	1.4	Mainframe Description	1-2
	1.5	Specification Summary	1-7
	1.6	Standard Accessories	1-9
	1.7	Optional Accessories	1-9
	1.8	Factory Repair	1-10
II	OPERATION		
	2.1	Load Ratings	2-1
	2.2	Data Format	2-1
	2.3	Operation of RS-232 Port and Printer	2-2
	2.4	Remote Operation	2-3
	2.5	Operating Controls	2-5
	2.6	Mainframe Operating Procedures	2-8
	2.6.1	Power On	2-8
	2.6.2	Setting Date and Time	2-9
	2.7	General Description of Other Procedures and Printouts	2-10
	2.7.1	Program Summary	2-10
	2.7.2	Data Summary	2-11
	2.7.3	Preset Factory Program	2-12
	2.7.4	Short Term Accumulator	2-12
	2.7.5	Daily Summary	2-12
	2.7.6	Installation of Paper Tape	2-13
	2.7.7	Cleaning Printheads	2-14
	2.7.8	Baud Rate	2-15
	2.7.9	Power Supply AC Voltage Selection	2-15
	2.7.10	Internal Battery Pack	2-16
III	OPERATIONAL CHECK		
	3.1	System Check	3-1

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

LIST OF ILLUSTRATIONS

Figure		Page
1-1	Model 626 Universal Disturbance Analyzer	1-Ø
1-2	Model 626 Universal Disturbance Analyzer, Rear View	1-4
1-3	RS232C Interconnect Cable	1-8
2-1	Mainframe Controls	2-6

LIST OF TABLES

Table		Page
1-1	Options Connector J1 Pinout	1-5
1-2	RS232C Port Pinout Description	1-6
1-3	Specification Summary	1-7
2-1	626 Remote Commands	2-4
2-2	Mainframe Controls	2-5

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

USER INFORMATION

NOTE

The 626 System is U.L. listed provided that the mainframe and all plug-ins used are U.L. listed (as indicated by a U.L. listed marking).

626 plug-ins that do not bear the U.L. listed marking are not U.L. listed. Although these plug-ins have been designed for use with the 626 and will function properly, such use will void U.L. listing of the entire 626 system.

WARNING

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user, at his own expense, will be required to take whatever measures may be required to correct the interference.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

STATEMENT OF WARRANTY

ALL PRODUCTS OF DRANETZ TECHNOLOGIES, INC. ARE WARRANTED TO THE ORIGINAL PURCHASER AGAINST DEFECTIVE MATERIAL AND WORKMANSHIP FOR A PERIOD OF ONE YEAR FROM THE DATE OF DELIVERY. DRANETZ WILL REPAIR OR REPLACE, AT ITS OPTION, ALL DEFECTIVE EQUIPMENT RETURNED, FREIGHT PREPAID, DURING THE WARRANTY PERIOD, WITHOUT CHARGE FOR REPAIR, PROVIDED THERE IS NO EVIDENCE THAT THE EQUIPMENT HAS BEEN MIS-HANDLED OR ABUSED.

NOTE

The information in this manual has been reviewed and is believed to be entirely reliable. However, no responsibility is assumed for any inaccuracies. The material in this manual is for information purposes only, and is subject to change without notice.

Figure 1-1. Model 626 Universal Disturbance Analyzer

COPYRIGHT © 1981,1982,1983,1984,1985,1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

VOLUME 1

OPERATOR'S MANUAL

MODEL 626 MAINFRAME

SECTION I

GENERAL INFORMATION

1.1 INTRODUCTION

This manual contains operating instructions for the Model 626 Universal Disturbance Analyzer Mainframe (See figure 1-1.) The Model 626, one member of the Series 626 family, consists of a mainframe into which may be installed up to five plug-in modules. A wide variety of module types are available for use. Each plug-in module designed for this microprocessor based universal-type instrument is equipped with its own software.

The mainframe provides the common functions, including power and time base, for all plug-ins; its characteristics and operation are described in this manual. Other manuals describe the different plug-ins, their characteristics and operation.

1.2 PURPOSE

As a Universal Disturbance Analyzer, the Model 626 may be used for many applications. For example, it monitors, measures, records and prints disturbances. Depending on the particular plug-ins installed, the instrument is capable of monitoring disturbances on single phase or 3-phase AC power lines, AC neutral power lines (with respect to earth ground), and DC lines. The Model 626 may also be used as a sequence of events recorder, recording and printing out any changes of state detected at its inputs. Details of these and other specific functions of this universal instrument are presented in other manuals.

NOTE

Printouts in the plug-in manuals for the Model 626 should be read from the bottom up. In other models of the Series 626 family, printouts read from the top down.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

1.3 FEATURES

a. Factory preset program

b. Time Mark: Includes optical coupled time mark circuit which causes Model 626 to print a time mark when externally supplied DC voltage appears at the rear panel options connector. The time mark is useful in providing time correlation with an external event.

Specifications

Input Voltage	5 to 12V DC
Input Current	4 mA @ 5V typical 22 mA @ 12V typical
Timing of applied voltage	Operates on leading edge
Pulse Width	100 uSec minimum
Pulse Rate	100 per sec.
Off Period	500 uSec minimum

1.4 MAINFRAME DESCRIPTION

1.4.1 Front Panel

The front panel of the Model 626 contains all operating controls and indicators, regardless of the particular plug-ins installed in the unit. The two horizontal groups of pushbutton switches, as well as the FUNCTION and PRINTOUT MODE switches, perform basically mainframe functions, with some variations controlled by the particular plug-ins installed. The numeric keyboard is used for both mainframe and module functions while the two left-side groups of switches are module related. To simplify programming, indicators adjacent to the three centrally located switch groups are used to cue the operator. During the interactive programming sequence, the indicators light when switches should be depressed and go out one by one as the operator makes his selections. A thermal printer at the upper right corner of the instrument furnishes an onboard printout of data. The paper supply is accessible behind a hinged cover below the printer. The high speed printout, at 2-1/2 lines per second, may be switched off at will by the operator, although disturbance data continues to be measured and stored. Since the Model 626 is equipped with an RS232C interface, data may still be transferred to a remote printer or peripheral device. Baud rate may be set by the user to maintain compatibility with the remote equipment.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

When the paper supply becomes low, a PAPER LOW message is printed and the thermal printer is automatically turned off to conserve paper. However, a daily summary of disturbance data accumulated during the previous 24-hour interval is printed automatically at midnight.

1.4.2 Real Time Clock

A crystal controlled (±25 PPM stability) real time clock in the mainframe is used as the source of time printouts. Time may be easily set by the operator, using the front panel facilities.

1.4.3 Audible Alarm

When the alarm circuits within the mainframe are enabled by the operator, a 1-second audible alarm sounds each time a disturbance or event change is detected (depending on modules installed). A pair of normally open dry contacts, accessible on a rear panel connector, may be used to activate a remote alarm.

1.4.4 Power Supply

A power supply module plugged into the rear of the instrument furnishes the power required for the mainframe and plug-in modules. (See figure 1-2.) The power supply may be operated from either 115 VAC or 230 VAC; a 115V/230V switch, located on its rear panel, selects the desired line voltage. (See paragraph 2.7.9 for instructions.) A 3-ampere fuse on this panel provides overload protection for either line voltage.

1.4.5 Battery Pack

An on-board battery pack in the mainframe, a standard feature, provides 10 to 40 minutes of uninterrupted operation if line power should fail. To increase back-up time, an external 12V battery source may be plugged into a connector on the power supply. However, the Model 626 will not operate from this source unless it is initialized by the AC line.

1.4.6 Communications Panel

The Communications Panel, mounted adjacent to the power supply module, contains options connector J1 and an RS232C connector J2.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

Figure 1-2. Model 626 Universal Disturbance Analyzer, Rear View

COPYRIGHT © 1981,1982,1983,1984,1985,1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

1.4.6.1 Options Connector J1

The options pinout is shown in Table 1-1. The alarm contacts, described in para. 1.4.3, are rated at 25 volts, 100 mA max. A second set of normally open contacts are undesignated at this printing. The time mark connections are provided as a standard feature. A DC voltage (para. 1.3) applied to these contacts produces a time mark along with printout of time. This feature enables the user to correlate an external event in time. Resolution of the time mark is 10 mSec. The isolated field contact supply (Option 102), rated at 5V DC with a 5K source impedance, is available for use with the 626-PA-6007 and 626-PA-6011 to enable activation from a dry contact.

Table 1-1. Options Connector J1 Pinout

Pin No.	Function
1	Alarm contact 1
2	Relay contact 2*
3	Time mark (-)
4	Field Contact Supply (-)
5	
6	Alarm contact
7	Relay contact 2*
8	Time mark (+)
9	Field Contact Supply (+)

---

*Undesignated

1.4.6.2 RS232 Port - Physical Description

Connector J2 provides an RS232C compatible communications port for remote printout and control of the 626. The port is configured as a DCE (Data Communications Equipment), with a drive capability of approximately 50 feet. The definition and operation of each pin of the 25-pin female "D" connector (J2) used by the 626 is described in Table 1-2. Note that the RS232C signal definitions are as viewed from a DTE, or the device connected to the 626.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

Table 1-2. RS232C Port Pinout Description

PIN	NAME	FUNCTION	DIRECTION	DESCRIPTION OF OPERATION
1	GND	Protective Gnd	N/A	Shield of interface cable should be connected to this pin which is tied to 626 frame ground internally.
2	XMT	Transmit Data	To 626	Serial data output from the connected device is sent to the 626. RTS and DTR must be TRUE for data to be recognized.
3	RCV	Receive Data	From 626	Serial data outputted by the 626 to the connected device, provided DTR and RTS are TRUE.
4	RTS	Request to Send	To 626	This signal must be TRUE for the 626 to recognize the presence of connected device. A FALSE state of more than 240msec will cause the RS232 PORT LOST message to be printed and proper action taken.
5	CTS	Clear to Send	From 626	This signal will be TRUE as long as the ACIA and driver circuitry of the RS232C port of the 626 are operational.
6	DSR	Data Set Ready	From 626	Same as CTS.
7	GND	Signal Ground	N/A	Internally connected in the 626 to pin 1.
8	DCD	Carrier Detect	N/U	Not used or provided. For devices requiring this signal to be TRUE, jumper pin 8 to pin 6 or 5.
15	XCLK	DCE Xmt Clock	From 626	Xmit clock of data outputted by the 626. Frequency = 16 x Baud rate.
17	RCLK	DCE Rcv Clock	From 626	Receive clock of data into the 626. Internally jumpered in the 626 to XCLK and DTE Xmit Clock. Hence, Xmit and Receive Baud rates must be the same.
20	DTR	Data Term. Ready	To 626	This signal must be TRUE for the 626 to acknowledge presence of connected device. FALSE state causes immediate disabling of port.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

1.4.6.3 Dranetz RS232C Interconnect Cable

[illegible] of the Model 106 to a [illegible] or telecommunications modem is made with a Dranetz special cable assembly part #[illegible]. [illegible] The cable ties pins 2 and 20 internally to simplify [illegible] a terminal, and supplies only a [illegible] signal to the [illegible] (DTR).

1.5 SPECIFICATION SUMMARY

Table 1-3 summarizes the specifications of the Model [illegible] instrument.

Table 1-3. Specification Summary

Plug-in Module Capacity	1 through 5
Time Clock	Crystal controlled, ±25 PPM Keyboard entry (approx.) ± 2 sec/day)
Alarm Circuits (Activated by any [illegible] disturbance)	1. Audible alarm, 1 second [illegible], keyboard selectable 2. Alarm Contact closure
Temperature Range	
Operating	+10 to +40° C
Storage	-20 to +55° C
Power Requirements	90-130V rms or 180-250V rms at 47 to 450 Hz, 50W nom. +12 VDC @ 3 Amps nom.
UPS Capacity	[illegible] minute operation on internal battery pack. 6-10 hr. recharge time.
Size	7-1/2" high x 11" wide x 15-1/2" deep
Data Output	Onboard thermal printer. RS232C Interface with control capability.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

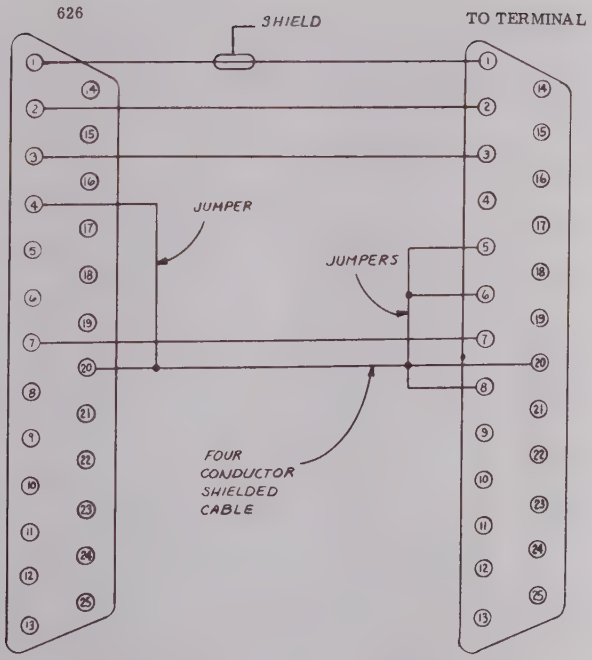


Figure 1-3. RS232C Interconnect Cable

COPYRIGHT © 1981,1982,1983,1984,1985,1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

STANDARD ACCESSORIES SHIPPED WITH ALL UNITS

Model No.	Part No.	Quantity	Description
626/626 8-10,	TM-106650U (Vol 1)	1	Operator's Manual
	107586	1	Mating Connector for 12V Battery
	104943 ↑ (or) ↓	1	AC Line Cord (for customers requesting 115V line cord.)
	110726	1	AC Line Cord (for customers requesting 230V line cord)

AMP

205204-1 (1)			Connector Housing
665570-3 (9)			Pin
205208-1 (1)	}	1 Set	Hood & Cable Clamp
110289-1 (1)			Instruction Decal
102714		3	Thermal Paper
103418		1 Set	Cleaning Paper

Option

Connector

Pl

NOTE

Option 101 for the Series 626, the multiple printout modes option, is a standard accessory of every Series 626 Mainframe.

1.7 OPTIONAL ACCESSORIES

Part No.	Quantity	Description
TM-106650U (Vol. 2)	1	Service Manual

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

1.8 FACTORY REPAIR

When factory repair is desired, proceed as follows:

1. Contact the Dranetz Service Corporation (formerly Dranetz Technologies, Inc. Customer Service Department) in order to obtain an Authorization Number for factory repair.

   Telephone No: (201) 755-7081

   TWX: (710) 997-9553

   Telex: 499-7808

   Cable: DRANETZ

2. Fill out the REPAIR/SERVICE ORDER enclosed in this manual and ship it with the equipment to the Dranetz Service Department.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

SECTION II

OPERATION

2.1 LOAD RATINGS

The 626 standard mainframe has an upper limit of the total load rating of the installed modules. The overall mainframe capacity is set at 20 units, and individual modules have load ratings as follows:

Plug-in	Load Ratings
626-PA-6001	2 Units
626-PA-6001 With Extra Option Board	3 Units
626-PA-6002	2 Units
626-PA-6003	4 Units
626-PA-6005	2 Units
626-PA-6006	2 Units
626-PA-6007	1 Unit
626-PA-6008	2 Units
626-PA-6009	4 Units
626-PA-6011	1 Unit
626-PA-6012	2 Units
626-PA-6012A	3 Units
626-PA-6013	2 Units
626-PA-6014	1 Unit
626-PA-6015	4 Units
626-PA-6018	4 Units
626-PA-6020	4 Units
626-PA-6024A	4 Units
626-PA-6024B	4 Units
626-PA-6030	6 Units

NOTE

When selecting modules for installation into any Series 626 Mainframe, verify that the sum of the load ratings of the installed modules DOES NOT exceed 20 Units.

2.2 DATA FORMAT

Data transmitted from and received by the 626 via the RS-232 port should be 11 bit ASCII format serial data. The exact format is as follows:

1 Start Bit / 7 Bits of Data / 1 Parity Bit (Even) / 2 Stop Bits

Devices that require only 1 stop bit on received data should function properly even with the 2 stop bits (second one is ignored). For characters sent to the 626 by a human operator, 1 stop bit is sufficient since the time between characters will easily exceed 2 stop bits duration. However, if the data is being sent by a high speed device (such as a computer), sufficient time between characters should be provided for, to prevent framing errors from occurring. Note: Such errors may result in misinterpretation of data.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

The baud rate is selectable from 110 to 9600 by switching S1 on the A2 board (See para. 2.7.8.) Higher baud rates (up to 19,200) are possible, but not advisable. The baud rate is factory preset to 1200. Xmit and Receive baud rates must be identical.

NOTE: Disturbance data and other printouts from the 626 contain EOT (ASCII 04) characters within and throughout the messages (unless the data is received via the 626-PA-6012, which strips out extraneous control characters). For devices that have an auto-disconnect feature on EOT, this feature should be disabled to prevent problems from occurring.

2.3 OPERATION OF RS-232 PORT AND PRINTER

The 626 mainframe comes equipped with a "SMART" RS-232 port. Upon powering up the unit, the RS-232 control lines are interrogated to determine the existence of a functional remote device (i.e. teletype, video terminal, etc.). If this test fails for any reason, the normal POWER ON messages (see par. 2.6.1) will be accompanied by an additional "RS-232 LOST" message and time printout. In this state, disabling the printer is not permitted. Thereafter, attempting to push the PRINT pushbutton will cause the following message to be printed:

```
    ↑   10/14/83   13:15:47
    |        RS232 LOST
    |        PRINTER ON
```

(Note: the unit "powers up" in the PRINTER ON mode).

If at any time thereafter, the RS-232 control lines are satisfied, a message: "RS232 RESTORED" and time/date will be printed, and normal operation will be restored.

If, during normal operation, the RS-232 control lines become invalid, the "RS-232 LOST" message and time/date will be printed. The unit is then forced into the "PRINTER ON" mode. The unit will, however, "REMEMBER" the last status of the printer, and upon restoration of proper RS-232 operation, print "RS-232 RESTORED" and time/date. It will then restore the previous status of the printer and print "PRINTER OFF" and time/date if applicable.

The "RS-232 LOST" message will be accompanied by a "PRINTER OFF" message only if the printer was off at the time.

The "RS-232 RESTORED " message will be accompanied by a "PRINTER OFF" message only if the printer was off at the time of the "RS-232 LOST" message.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

2.4 REMOTE OPERATION

[illegible] the 626's peripheral port to another [illegible], a remote device connected to the second port may request and receive status information. The remote commands, which may be entered from a terminal via the printer's [illegible] port, are [illegible].

The printer responds with [illegible] or [illegible] if the [illegible] parity [illegible] and remote display device. Invalid characters are echoed with a [illegible].

The 626's peripheral port [illegible] can be [illegible] to either LOCAL or REMOTE ONLY MODE.

2.4.1 Local Mode

When the [illegible] is turned on, it will start in [illegible] mode. In this mode, the 626 responds only to commands entered from the front panel and ignores inputs received through the RS232C port, with one exception. The [illegible] character. Each time this character is received, the 626 will [illegible] between LOCAL and REMOTE ONLY Mode.

2.4.2 Remote Only Mode

When placed in REMOTE ONLY MODE, the 626 will respond only to commands received through the RS232C interface. The only exceptions are the "ON" and "READY" positions of the POWER switch. As shown in Table 2-1, an ASCII character has been [illegible] to each front panel push button or switch function (except "ON" and "READY"). For operator convenience, a [illegible] card with all remote commands is supplied in this manual.

2.4.3 Using the Thermal Printer as a Line Printer

The thermal printers on units delivered after October 1, 1982 can be made to function as line printers by executing the following ASCII commands:

~	(Tilde): Puts 626 in REMOTE ONLY mode
{	(Open Brace): Puts 626 in LINE PRINTER mode
}	(Close Brace): Takes 626 out of LINE PRINTER mode

When used as a line printer, the 626 will print all data received via its RS232C port. The data is not echoed back to the source. Printing is in 20 columns, with a carriage return automatically generated after the 20th column.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

Table 2-1. 626 Remote Commands

(Valid ONLY in REMOTE ONLY Mode)

Front Panel Control Function Switch	Equivalent ASCII COMMAND	Front Panel Control Programming Pushbuttons	Equivalent ASCII COMMAND
OFF	None-Local Only	RANGE	R
OPERATE	O	INPUT	J
PROGRAM	G	ENTER	E
CLEAR DATA	K	LO LIMIT	L
RESET	None-Local Only	HI LIMIT	H
PRINTOUT MODE Switch		SENS	S
SUMMARY ONLY	M	IMP SENS	I
OUT-OF-LIMITS ONLY	U	F SENS	F
NORMAL	N	FNC (Function)	<
MAXIMUM DETAIL	X	Ø-9 (Yellow Pushbuttons)	Ø-9
CALIBRATE (System Check)	C	•: (Decimal Point)	•
Upper Pushbuttons		•: (Colon)	:
ALARM	Q(To turn OFF or to A turn ON)	CLEAR ENTRY	Delete
		LOWER PUSHBUTTONS	
PRINTER	Z	Clock	/ (Slash)
PRESET	T	1 (CH 1)	a
DATA	D	2 (CH 2)	b
PROG	P	3 (CH 3)	c
FEED	(Space)	4 (CH 4)	d
		5 (CH 5)	e
Special Command			
REMOTE/LOCAL MODE Selection	~ (Tilde Alternately selects REMOTE ONLY and LOCAL modes		

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

Table 2-1. 626 Remote Commands

(Valid ONLY in REMOTE ONLY Mode)

Front Panel Control Function Switch	Equivalent ASCII COMMAND Programming Pushbutton	Front Panel Control	Equivalent ASCII COMMAND
OFF	None-Local Only	RANGE	R
OPERATE	O	INPUT	J
PROGRAM	G	ENTER	E
CLEAR DATA	K	LO LIMIT	L
RESET	None-Local Only	HI LIMIT	H
PRINTOUT MODE Switch		SENS	S
SUMMARY ONLY	M	IMP SENS	I
OUT-OF-LIMITS ONLY	U	F SENS	F
NORMAL	N	FNC (Function)	<
MAXIMUM DETAIL	X	0-9 (Yellow Pushbuttons)	0-9
CALIBRATE (System Check)	C	• (Decimal Point)	•
Upper Pushbuttons		: (Colon)	:
ALARM	Q(To turn OFF or to A turn ON)	CLEAR ENTRY	Delete
		LOWER PUSHBUTTONS	
PRINTER	Z	Clock	/ (Slash)
PRESET	T	1 (CH 1)	a
DATA	D	2 (CH 2)	b
PROG	P	3 (CH 3)	c
FEED	(Space)	4 (CH 4)	d
		5 (CH 5)	e

Special Command
REMOTE/LOCAL MODE Selection ~ (Tilde Alternately selects REMOTE ONLY and LOCAL modes

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

2.5 OPERATING CONTROLS (See figure 2-1.)

The functions of these operating controls primary to operation of the mainframe (i.e., used with all plug-in types) are summarized in Table 2-2, where a control function which operates with a particular plug-in type, and explained in detail under the appropriate plug-in. Other plug-in controls are included only for use with certain plug-in modules, and are described in other manuals, in conjunction with the associated modules.

Table 2-2. Mainframe Controls

Item	Function
ALARM pushbutton	When depressed to "in" position, enables alarm circuit.*
PRINT pushbutton	A momentary pushbutton which alternately enables or disables the thermal printer. With each depression of this pushbutton, the printer will echo either "PRINTER ON" and time/date, or "PRINTER OFF" and time/date. In the latter case, further printout is inhibited unless one of the following occurs: 1. Power is turned off or on. 2. End of day produces daily accumulated summary. 3. RS-232 is lost. 4. Power is lost.
PRESET	(Plug-in function)
DATA pushbutton	When depressed to "in" position, and with function switch in operate position, unit prints out date, time and contents of daily accumulator in each channel (instrument slot position) in sequence (1-5).
PROG pushbutton	When depressed to "in" position, and with FUNCTION switch in OPERATE position, unit prints time/date and a summary of the program (threshold settings) in each channel in sequence (1-5).

*Some types of disturbances or event changes cause 1-second audible tones to sound.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

Figure 2-1. Mainframe Controls

COPYRIGHT © 1981,1982,1983,1984,1985,1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

Table 2-2. Mainframe Controls (Cont'd.)

Item	Function
FEED pushbutton	When held in depressed position, causes paper to feed out of thermal printer.
ENTER pushbutton	[illegible] into real time clock or plug-in program.
Numeric keyboard (0-9, ., and (CLEAR ENTRY)	Used to enter constants when setting time/date or programming.
CLOCK pushbutton	[illegible] switch in PROGRAM position, enables operator to set time and date.
1-5 pushbuttons	When depressed to "in" position, and with FUNCTION switch in PROGRAM position, selects plug-in channel for programming.
FUNCTION key switch	OFF: Turns off instrument. [illegible] be activated. PROGRAM: enables user to program real time or thresholds of selected channel. CLEAR DATA: Clears all daily accumulators, [illegible] affect real time. RESET: Hard wire reset to central processing [illegible] not reset time, date or program information.
LINE-BATT indicator	Green LINE indicator lights when AC power is present. Red BATT indicator lights when power is lost and unit is automatically switched to battery source.

COPYRIGHT (c) 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

Table 2-2.. Mainframe Controls (Cont'd.)

Item	Function
PRINTOUT MODE key switch	Printout data reduction occurs as switch is rotated ccw. Key (identical to FUNCTION switch key) may be removed in any position. SYSTEM CHECK: Puts all channels in system check mode, and printout (in sequence) is produced by self-contained calibrated signals. MAXIMUM DETAIL: Produces detailed printout (function of plug-in). NORMAL: Produces less detail (function of plug-in). OUT-OF-LIMITS ONLY: Prints disturbance data only when out of limits. SUMMARY ONLY: Printer is inhibited. All data is still loaded into daily accumulators. Provides Daily Summary at midnight.

2.6 MAINFRAME OPERATING PROCEDURES

2.6.1 Power On

With instrument plugged into AC power source, rotate FUNCTION key switch from OFF to OPERATE. The printer will provide a Power On message that shows date and time, mode of selected function and printout mode. Note: An external device is connected to the RS232 Port in this printout. If device is not connected, "RS232 LOST" message will also be printed.

Example:

```
    MAXIMUM DETAIL
    OPERATE MODE
10/14/83   13:27:04
    LOCAL MODE
10/14/83   13:27:04
    POWER ON RESET
```


COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

When power is applied, the instrument performs diagnostics on its own internal circuitry and on the internal memory which is maintained during power off intervals by the internal battery pack. Thus, the Model 1065 can retain its program in the memory during power off. Each time the instrument is turned on, all modules are reinitialized to their previous configuration, even after extended periods of time. If a POWER ON RESET message is received, the memory is validated.

If the self diagnostics of the internal memory determine that the memory is invalid (e.g., if the real time board or the batteries are low), the unit prints

```
↑       POWER ON RESET
        MEMORY INVALID
```

This indicates that the user RAM memory contents as well as the program is lost. Another self diagnostics feature tests the ROM RAM. Failure would be indicated by a "ROM RAM FAILED" message in the printout.

2.6.2 Setting Date and Time

This maintenance function should be performed when real time must be reset (e.g., when time zones are switched, if back up power fails, etc.). The procedures are detailed below.

2.6.2.1 Setting Date

a. Depress the CLOCK pushbutton and set the FUNCTION switch to PROGRAM. The instrument now prints the existing (old) date and time followed by an "ENTER DATE" message:

```
        (MM:DD:YY)
        ENTER DATE
↑   10/14/83   13:37:48
        PROGRAM MODE
```

b. Note that the two right-most cueing indicators above the numeric keyboard light, indicating that two pushbuttons on the keyboard must be depressed to enter the month (indicated on the printout as "MM"). Upon entering the month, the two indicators go out and the cueing indicator adjacent to the semicolon pushbutton lights. When the semicolon pushbutton is depressed, the same two cueing indicators above the numeric keyboard light again. This indicates that the day should now be entered ("DD" on the printout). Once again these cueing indicators go out when the day is entered and the cueing indicator adjacent to the semicolon pushbutton lights. When the semicolon pushbutton is depressed again, the two cueing indicators above the numeric keyboard light. This indicates that the year should now be entered ("YY" on the printout).

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

c. After the year is entered, the indicator next to the ENTER pushbutton lights. Depress the ENTER pushbutton to register the date on the instrument. The cueing indicator turns off and a printout takes the following form:

```
↑  ENTER TIME (HH:MM)
|  10/14/83   13:39:42
```

2.6.2.2 Setting Time

a. The two rightmost cueing indicators above the numeric keyboard light again, indicating that two pushbuttons on the keyboard must be depressed to enter hours (symbolized by "HH" on the printout). Upon entering hours, the two indicators go out and the cueing indicator adjacent to the semicolon pushbutton lights. When the semicolon pushbutton is depressed, the same two cueing indicators above the numeric keyboard light again, indicating that minutes should be entered.

b. When time (both minutes and hours) has been entered, the indicator next to the ENTER pushbutton lights. Assume that it is almost 12:30:00. At precisely 12:30:00, depress the ENTER pushbutton. This enters the time and turns off the cueing indicator. The printout takes the following form:

```
↑       (MM:DD:YY)
|       ENTER DATE
     0/14/83   12:30:00
```

After proper time and date have been entered, the operator may disregard the ENTER DATE message and proceed to program a plug-in channel or return to OPERATE MODE.

2.7 GENERAL DESCRIPTION OF OTHER OPERATING PROCEDURES AND PRINTOUTS

The following information is presented to give the user an overview of the instrument's operation and to avoid excessive repetition in later sections of this manual. Although some of the printouts necessarily include specific plug-in programs and data, only details common to overall operation (with any plug-in types) are highlighted.

2.7.1 Program Summary

To operate a summary of the programs stored in the installed plug-ins, set FUNCTION switch to OPERATE and depress PROG pushbutton.

Example: Three 626-PA-6001 plug-ins are installed in channels 1, 2, and 3. Channels 4 and 5 are empty. Note that the printout is identified as PROGRAM SUMMARY, time and date are furnished and each plug-in is identified by slot position and type.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

```
IMPULSE SENS 0.00V
FREQ SENS    00.5HZ
VOLTAGE SENS  000V
V LOW LIMIT   105V
V HIGH LIMIT  125V
NOMINAL V     115V
   626-PA-600.
      CH 3

IMPULSE SENS 0.00V
FREQ SENS 00.5 HZ
VOLTAGE SENS 000V
V LOW LIMIT  105V
V HIGH LIMIT 125V
NOMINAL V    115V
   626-PA-600.
      CH 2

 IMPULSE SENS 0.00V
 FREQ SENS    00.5HZ
 VOLTAGE SENS 000 V
 V LOW LIMIT  105 V
 V HIGH LIMIT 125 V
 NOMINAL V    115V
   626-PA-600.
      CH 1

10/14/83   15:30:00
 PROGRAM SUMMARY
```

2.7.2 Data Summary

To obtain a summary of data, set FUNCTION switch to OPERATE and depress DATA pushbutton. The data summary provides the date, present time, present values and the total number and worst case of each type of disturbance for each channel of each plug-in.

Example: With three 626-PA-600A plug-ins installed in the mainframe, disturbance data recorded on channel 1 is printed out. (No data has been recorded on channels 2 and 3.

NOTE: HT stands for "hits". The 002 indicates two impulse "hits" or occurrences with the largest being 377V.

```
      CH 3
      CH 2
IMP 0377V 002 HT
   626-PA-600A
      CH 1
02/15/84   12:43:38
    DATA SUMMARY
```

COPYRIGHT (C) 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

2.7.3 Preset Factory Program

In the event the last program is lost, the program base for the plug-ins is automatically derived from factory-preset non-volatile memory (located in the plug-in). Standard programs are normally prepared for hard storage. As an option, user selected programs may be loaded into hard storage at the factory. The instrument reverts to the hard storage program when a MEMORY INVALID condition exists or when the operator depresses the PRESET pushbutton while in the program mode with the appropriate module selected.

2.7.4 Short Term Accumulator

The internal stack has the capability of handling at least 32 disturbances, more if multiple disturbances occur in a single time frame (10 mSec). Data is sent to the stack and is then printed out.

In the case where the data output cannot keep up with the data input, the stack will overflow. While the stack is full, the worst case data is sent to the Short Term Accumulator. After the Short Term Accumulator data is printed, it is cleared. The printout format is as follows:

```
      IMP        0166V      014 HT
      SAG        107.6V     002 HT
↑     V LO       105.4V     001 HT

            626-PA-6001
                CH4
            SUMMARY MODE
```

2.7.5 Daily Summary

When the real time clock reaches 23:59:59.59, presumably at midnight, it will reset to 00:00:00.00 and print a daily summary which will consist of all the accumulated data of that day and then reset to begin accumulation for the present day.

The daily summary for Oct. 14th would read as follows:

```
      IMP        039.7V     003 HT
      SAG        000.0V     001 HT

↑           626-PA-6001
              CH1
        10/15/83   00:00:00
          DAILY SUMMARY
```


COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

2.7.6 Installation of Paper Tape

The instrument is shipped with a roll of paper already installed. During operation, when the paper supply becomes low, the unit will automatically print

↑ SUMMARY ONLY
PAPER LOW

and operation will be switched to the SUMMARY data mode (regardless of the PRINTOUT MODE switch setting), indicating that the paper roll should be replaced. After the paper is replaced, the unit reverts back to the setting of the PRINTOUT MODE switch.

NOTE

In the SUMMARY ONLY mode, normal printout of the instrument data is inhibited and only the daily accumulated summary is printed. Therefore, it is recommended that a large number of measurements will not occur during a period of unattended operation, do not wait for a PAPER LOW condition - install a full roll of paper.

Before replacing the thermally sensitive paper, clean the printhead as described in paragraph 2.7.7. After cleaning the printhead, replace the paper roll as follows:

a. Pull two black cover latches to lower cover.

b. Tear paper roll just above old roll. Do not remove remaining paper from printer.

c. Push two spring paper holders outward to release old paper roll and remove roll.

d. Remove holding tab from new paper roll to release end of roll. Use a scissors to cut edge of the paper straight.

e. Holding the paper roll so that it unrolls, expand the two spring paper holders, install the roll, then release the holders to lock the roll in place.

NOTE
If there is no paper in printer, proceed directly to step i.

f. Ensuring that the new paper is aligned correctly to avoid jamming, insert the cut end between the rubber roller and the remaining old paper so that the old and new paper overlap.

COPYRIGHT (C) 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

g. Depress and hold FEED pushbutton until the new paper comes into view and the old paper is completely out of the printer.

h. Raise cover and guide paper through opening, then lock cover in place.

NOTE

Proceed with the following steps only if there is no paper in printer.

CAUTION

BE SURE THAT HANDS ARE CLEAN. ANY GREASE OR FOREIGN MATTER ON HANDS MAY CONTAMINATE ROLLER AND CAUSE PRINTER TO MALFUNCTION.

i. Using one hand, feed the cut end of the new paper between the rubber roller and the feed chute opening under the printer. Using the thumb on the other hand, gently rotate rubber roller in the forward direction until the paper comes into view.

j. Depress and hold FEED pushbutton to ascertain that paper moves smoothly. If not, repeat procedure to step i.

k. Raise cover, guide paper tape through opening, then lock cover in place.

NOTE

Due to the coiling action of the paper on its spool, it is likely that repetitive printouts of the PAPER LOW message will occur until the paper supply is clearly below the triggering point of the optical paper sensors. This occurrence is intentional and should not be a cause for concern.

2.7.7 Cleaning Printheads

During the course of normal printer operation, minute particles of thermal sensitive material tend to be dislodged from the surface of the printer paper. These particles accumulate on the surface of the heating matrix in the printhead. This causes a reduction in heat-flow to the paper, causing the following symptoms:

Print density too light
No printout
Missing dots

To clean the printhead in the simplest and preferred method, particles may be removed by inserting a length of bond paper (approximately 10 inches in length cut to width of 2.25 inches) into the printer and operating the printer by pressing the FEED button until the length of

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

paper passes through the printer. Insert this paper as far back as if replacing the paper roll.

NOTE

For your convenience, Dranetz has made available a special paper roll (Dranetz P/N 10464). This paper serves as an abrasive which buffs the surface of the printhead clean. It is recommended as good practice to clean the printhead each time the thermal sensitive paper roll is replaced.

2.7.8 Baud Rate

The baud rate is factory set to 300. Its associated dipswitch, switch #1 should be set as indicated below. (Refer to Figure 2-2 this manual for detailed information on setting this switch.)

Sw Pos	Baud Rate	Sw Pos	Baud Rate
0	50	8	1800
1	75	9	2000
2	110	A	2400
3	134	B	3600
4	150	C	4800
5	300	D	7200
6	600	E	9600
7	1200	F	19200

2.7.9 Power Supply AC Voltage Selection

A 115/230V switch on the rear panel of the Power Supply Module enables its operation from either 115V or 230V nominal AC power sources. To program this switch for the desired power line voltage, proceed as follows:

a. Set the key switch to OFF; turn off power source and disconnect the power cord from the unit.

b. Disconnect all measurement inputs from unit.

c. Using a small screwdriver or other suitable tool, set the 115/230V switch to the desired position.

d. For 115V operation, install AC cord (Dranetz P/N 10494) between the unit and 115V power source.

NOTE

This power cord is a standard accessory supplied when the 606 is factory set to 115V. When operating at 230V, AC cord P/N 110726 is mandatory.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

2.7.10 Internal Battery Pack

If an AC power failure should occur, the battery pack maintains full operation. The green LINE indicator on the front panel goes out and the red BATT indicator lights. The printer outputs a BATTERY ON message which also provides the time/date of this occurrence.

Example:

```
10/14/83   15:40:29
   BATTERY ON
```

If the output of the internal battery pack drops below operating level, a POWER LOSS message is printed, indicating that no further data may be processed. The unit is then automatically switched off. Time, date, data and program information will be valid for up to 2 weeks after power loss.

Example:

```
10/14/83   15:47:26
   POWER LOSS
```

When line power is restored, a POWER RESTORED message is printed.

Example:

```
10/14/83   15:43:39
   POWER RESTORED
```

NOTE

The internal battery pack will recharge to full capacity in approximately 10 hours with the mainframe connected to AC lines and unit operating.

When the instrument is turned off, a POWER OFF message is printed, along with date and time.

Example:

```
10/14/83   15:45:16
   POWER OFF
```


COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

SECTION III

OPERATIONAL CHECK

3.1 SYSTEM CHECK

To activate a system check, which will verify the performance of the plug-in installed in the mainframe, set the selector knob switch to SYSTEM CHECK. This replaces the normal inputs to all plug-ins with internally generated precision test inputs. The printout then indicates the results of processing the test inputs. The test printout should then be compared against the Operator's Manual to determine the accuracy of the plug-ins.

Example: The following printout resulting from the test mode for [illegible] installed in channels 3, 2, and 1. Note that the printout starts and ends with asterisks.

```
**********

PRESENT F 060.0 HZ
PRESENT V 119.6 V
IMP   + 0160 V PK
      CH 3
PRESENT F 060.0 HZ
PRESENT V 119.6 V
IMP   + 0160 V PK
      CH 2
PRESENT F 060.0 HZ
PRESENT V 120.4 V
IMP   + 0160 V PK
      CH 1
10/14/83  15:16:43
******SYSTEMCHECK******
```

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

WARNING

Because of possible shock or fire hazards, connection of this instrument should be performed in compliance with the National Electrical Code (ANSI C1) and/or any other requirements which may be applicable to the user.

Installation, operation, and maintenance should be performed only by qualified personnel.

TM-.06705U

VOLUME 1

OPERATOR'S MANUAL

626-PA-6001

SINGLE PHASE AC MONITOR

NOTE

Refer to Volume 2 (Service Manual) of TM-..0650 for maintenance data.

1 May 1984
(Rev. 1 September 1985)
(Rev. 1 May 1986)
(Rev. 15 May 1987)

© COPYRIGHT 1982, 1983, 1984, 1985, 1986, 1987
BY DRANETZ TECHNOLOGIES, INC. EDISON, NEW JERSEY.
ALL RIGHTS RESERVED.

DRANETZ

DRANETZ TECHNOLOGIES, INC.
1000 New Durham Rd., PO Box 4019
Edison, New Jersey 08818-4019

NOTICE CONCERNING DRANETZ' PROPRIETARY RIGHTS

This publication contains information proprietary to Dranetz Technologies, Inc. By accepting and using this manual, the user agrees that the information contained herein will be used solely for the purpose of repairing or operating equipment of Dranetz Technologies, Inc. These manuals are to be returned to Dranetz Technologies, Inc. when no longer required by the user, or when there is a change in ownership of the equipment.

These publications are protected under the Copyright laws of the United States Title 17 et seq. No part of this publication may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language or computer language, in any form, by any means, electronic, mechanical, magnetic, optical, chemical, manual, or otherwise, without the expressed written consent of Dranetz Technologies, Incorporated, 1000 New Durham Road, PO Box 4019, Edison, New Jersey 08818-4019.

TABLE OF CONTENTS

626-PA-6001 SINGLE PHASE AC MONITOR

VOLUME 1

Section			Page
I	GENERAL INFORMATION		1-1
	1.1	Scope	1-1
	1.2	Introduction	1-
	1.3	Purpose	1-
	1.4	Applications	1-
	1.5	Equipment Characteristics	1-
	1.6	Standard Accessories	1-4
	1.7	Optional Accessories	1-
	1.8	Factory Repair	1-
II	INSTALLATION AND OPERATION		2-1
	2.1	Installation	2-
	2.1.1	Load Ratings	2-
	2.2	Connecting Power Source to Module	2-
	2.2.1	Connection Procedure	2-
	2.2.2	Circuit Applications	2-
	2.2.3	Installation Guidelines	2-
	2.3	Operating the 6001	2-
	2.3.1	Operating Controls and Indicators	2-
	2.3.2	Selecting the Voltage Range	2-
	2.3.3	Programming Procedure	2-9
	2.4	Selecting the Factory Preset Program	2-11
	2.5	Description of Data Printouts	2-11
	2.5.1	Overvoltage	2-12
	2.5.2	Undervoltage	2-12
	2.5.3	Voltage Change	2-12
	2.5.4	Voltage Surge	2-13
	2.5.5	Voltage Sag	2-13
	2.5.6	Impulses	2-13
	2.5.7	Frequency Change	2-14
	2.6	Printout Modes	2-14
III	OPERATIONAL TEST		3-1
	3.1	General	3-1
	3.2	System Check	3-1
	3.3	System Check Signals	3-1
	3.4	System Check Tolerances	3-1

COPYRIGHT © 1982, 1983, 1984, 1985, 1986, 1987
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

TABLE OF CONTENTS (CONT'D)

		Page
APPENDIX A.	IMPULSE DURATION/DIRECTION OPTION (OPTION 101)	A-1
A.1	Introduction	A-1
A.2	Purpose	A-1
A.3	Equipment Characteristics	A-2
A.4	Installation in Mainframe	A-2
A.5	Connections to the Module	A-2
A.6	Operating the 6001 with Option 101	A-2
A.7	Description of Data Printouts	A-4
A.8	Printout Modes	A-5
APPENDIX B.	IMPULSE STRENGTH/DIRECTION OPTION (OPTION 102)	B-1
B.1	Introduction	B-1
B.2	Purpose	B-1
B.3	Equipment Characteristics	B-1
B.4	Installation in Mainframe	B-2
B.5	Connections to the Module	B-2
B.6	Operating the 6001 with Option 102	B-2
B.7	Description of Data Printouts	B-2
B.8	Printout Modes	B-4

LIST OF ILLUSTRATIONS

Figure		Page
2-1	Series 625 Controls Used by the 6001 Plug-In	2-8
2-2	Overvoltage Disturbance (6001)	2-15
2-3	Voltage Sag Disturbance (6001)	2-15
A-1	Proper Connections of 6001 for use with Current Probe	A-3
A-2	Impulse Duration Measurement	A-5
B-1	Impulse Strength Measurement	B-4

LIST OF TABLES

Table		Page
1-1	625-PA-6001 Technical Specifications	1-3
2-1	6001 Plug-In Operating Controls	2-7
A-1	625-PA-6001 Option 101 Technical Specifications	A-1
B-1	625-PA-6001 Option 102 Technical Specifications	B-1

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

STATEMENT OF WARRANTY

ALL PRODUCTS OF ORANETZ TECHNOLOGIES, INC. ARE WARRANTED TO THE ORIGINAL PURCHASER AGAINST DEFECTIVE MATERIAL AND WORKMANSHIP FOR A PERIOD OF ONE YEAR FROM THE DATE OF DELIVERY. ORANETZ WILL REPAIR OR REPLACE, AT ITS OPTION, ALL DEFECTIVE EQUIPMENT RETURNED, FREIGHT PREPAID, DURING THE WARRANTY PERIOD, WITHOUT CHARGE FOR REPAIR, PROVIDED THERE IS NO EVIDENCE THAT THE EQUIPMENT HAS BEEN MIS-HANDLED OR ABUSED.

NOTE

The information in this manual has been reviewed and is believed to be entirely reliable. However, no responsibility is assumed for any inaccuracies. The material in this manual is for information purposes only, and is subject to change without notice.

VOLUME 1
OPERATOR'S MANUAL

626-PA-6001 SINGLE PHASE AC MONITOR

SECTION I
GENERAL INFORMATION

1.1 SCOPE

This manual consists of two volumes. Volume 1, the Operator's Manual, is divided into three sections: I GENERAL INFORMATION, II INSTALLATION AND OPERATION, and III OPERATIONAL TEST. Volume 2, the service manual, contains the maintenance instructions and circuits (in four sections, IV through VII. (See Volume 2 for a description of these sections.)

1.2 INTRODUCTION

This manual provides the operating instructions for the 626-PA-6001, Single Phase AC Monitor plug-in, hereinafter referred to as the 6001 plug-in. The 6001 plug-in is designed for installation into the Dranetz 626 Universal Disturbance Analyzer Mainframe, referred to as the Dranetz 626. Before reading these instructions, read the mainframe information described in Volume 1 of the Mainframe manual.

1.3 PURPOSE

The 6001 plug-in is designed to monitor single phase AC power lines. With thresholds programmed by the user, the 6001 monitors both short and long term power line disturbances. With this plug-in, the unit senses, analyzes, classifies and prints out quantative and qualitative disturbance data. Accompanying the data is a printout of time derived from a highly accurate crystal-controlled 24-hour clock in the mainframe.

The plug-in monitors any single phase power line whose RMS values range from a low value of 20 volts to as high as 600 volts, programmable in three broad ranges. Three types of disturbances are monitored by the 6001: power line frequency, power frequency transients and waveform disturbances. Power frequency transients are divided into five display categories: overvoltage, undervoltage, voltage change, voltage surge and voltage sag. Waveform disturbances, identified as "impulses," include all conditions that cause the power line waveform to deviate from an ideal waveform. The 6001 measures both the peak amplitude of impulses and their polarity. When equipped with an option board, the 6001 also measures pulse duration and direction or pulse area and direction. The threshold value of each type of disturbance, as well as the line frequency, above which detection and printout occurs, is operator programmable. Except for an automatic summary printout at the end of each day, disturbance data is normally printed out only when the

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

disturbances occur. In an alternate mode, a disturbance data summary printout occurs only at the end of each day. This feature permits long term unattended operation.

The threshold program may be easily altered, using the front panel switches. Cueing indicators adjacent to the programming switches simplify the programming procedure. A back-up program for the plug-in, stored in hard memory at the factory, may always be recalled upon operator demand. Both the program and the disturbance data in the data accumulators may be printed out upon demand.

1.4 APPLICATIONS

When installed in the 626 mainframe, the 6001 provides the capability of monitoring and evaluating power system performance. Among its typical applications are the following:

a. To determine the effect of power systems operation on equipment malfunction. The time-referenced power fault disturbance record produced by the instrument permits rapid correlation of errors, outages, and equipment damage in computer, industrial process controls, digital communications equipment, medical monitoring apparatus, and so forth, to power line faults.

b. To perform pre-installation site surveys. The 6001 can be used to determine the adequacy of existing power lines intended to support critical electrical equipment. Anticipation of power problems saves time, money, and future trouble.

c. For diagnostic evaluation of power system performance. The portable instrument, particularly well suited for field use, is ideal for determining the probable causes of, and remedies for, power line disturbances.

d. For monitoring life test racks. The printout produced by the instrument provides a clear record of the quality of power supplied during unattended periods.

1.5 EQUIPMENT CHARACTERISTICS

The 6001 is configured as a plug-in module 6.5" high by 1.25" wide x 10" deep. It is designed for installation in any one of the five slots of the Series 626 Universal Disturbance Analyzer. Technical specifications of the 6001 are presented in Table 1-1.

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

Table 1-1. 626-PA-600 Technical Specifications

Input	2 wire differential Z_{in} = 40 Megohms plus 40 pf (each side to ground)
Full Scale Input Voltage Ranges	200V F.S. 400V F.S. 600V F.S.
Input Voltage Frequency	45 - 65 Hz
Overall Input Voltage Ranges	20 - 200 VAC 40 - 400 VAC 80 - 600 VAC
Lower Limit of User-Set Voltage (1V Increments)	200V F.S. Range [illegible] 400V F.S. Range [illegible] 600V F.S. Range 80 - 594 VAC
Upper Limit of User-Set Voltage	200V F.S. Range [illegible] 400V F.S. Range [illegible] 600V F.S. Range 94 - 600 VAC
Voltage Change Sensitivity (1V Increments)	
200V F.S. Range	1 - 15 volts
400V F.S. Range	2 - 30 volts
600V F.S. Range	4 - 60 volts
Line Voltage Measurement Accuracy	±1% of reading, ±0.2% of F.S. [illegible] Calibration frequency at 50 or 60 Hz. Additional ±1% at frequency extremes.
Line Voltage Measurement Resolution	
200V F.S. Range	0.2 Vrms
400V F.S. Range	0.4 Vrms
600V F.S. Range	0.8 Vrms
Impulse Ranges (2 mSec to 1 uSec)	
200V F.S. Range	25 - 1000V
400V F.S. Range	50 - 2000V
600V F.S. Range	100- 4000V

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

Table 1-1. 626-PA-6001 Technical Specifications (Cont'd.)

Impulse Thresholds (1V Increments)	
200V F.S. Range	25 - 1000V
400V F.S. Range	50 - 2000V
600V F.S. Range	100- 4000V
Impulse Accuracy	±5% of reading ±1% F.S. for half-sinewave impulses 10 uSec in duration regardless of polarity or grounding. Error increases to ±10% of reading, ±1% F.S. at 5 uSec and 50 uSec pulse durations, and is -6 dB typ. at 2 mSec and 1 uSec pulse widths
Line Frequency	
Range	45 - 65 Hz
Resolution	±0.1 Hz
Accuracy	±0.2 Hz
Program Limits	.2 Hz to 3.0 Hz (.1 Hz Increments)

1.6 STANDARD ACCESSORIES

Model No.	Part No.	Quantity	Description
626PA-6001-1 (-3)	TM-106705U Vol 1	1	Operator's Manual
626PA-6001-2 (-4)	TM-106705U Vol 1	1	Operator's Manual
	110480-G1	1	AC Cable with tinned leads

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

1.7 OPTIONAL ACCESSORIES

Part No.	Quantity	Description
TM-.86705U, Volume 2	1	Service (Maintenance) Manual
110481-G2	1	AC Cable with clip leads

Plug-in Configurations

626-PA-600.-. 60 Hz calibration with barrier strip inputs

626-PA-600.-2 60 Hz calibration with connector inputs

626-PA-600.-3 50 Hz calibration with barrier strip inputs

626-PA-600.-4 50 Hz calibration with connector inputs

1.8 FACTORY REPAIR

When factory repair is required, proceed as follows:

1. Contact the Dranetz Service Corporation (or the Dranetz Technologies, Inc., Customer Service Department in order to obtain an Authorization Number for factory repair.

Telephone No.	(201) 755-7081
TWX:	(710) 997-9553
Telex:	499-7808
Cable:	DRANETZ

2. Fill out the REPAIR/SERVICE ORDER form enclosed in the Series 626 Mainframe Operating Manual. Ship it along with the malfunctioning equipment to the Dranetz Service Corporation.

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

SECTION II

INSTALLATION AND OPERATION

2.1 INSTALLATION

To install the 600 plug-in into the mainframe, proceed as follows:

CAUTION: Be sure the Series 626 Mainframe and all of the power connected to its modules is turned off.

a. Position the top and bottom front corners of the plug-in module into the upper and lower tracks at the desired slot position at the rear of the Series 626 Mainframe.

b. Carefully slide the module into the mainframe until it is firmly in position.

c. Tighten the top and bottom captive screws to secure the module to the mainframe.

2.1.1 LOAD RATINGS

The Series 626 standard mainframe has an upper limit of the combined total rating of the installed modules. The Series 626 mainframe capacity is set at 20 units, and individual modules have load ratings as follows:

Plug-in	Load Rating
626-PA-6001	2 Units
626-PA-6001 with Extra Option Board	3 Units
626-PA-6002	2 Units
626-PA-6003	4 Units
626-PA-6005	2 Units
626-PA-6006	2 Units
626-PA-6007	1 Unit
626-PA-6008	2 Units
626-PA-6009	4 Units
626-PA-6011	1 Unit
626-PA-6012	2 Units
626-PA-6012A	3 Units
626-PA-6013	2 Units
626-PA-6014	1 Unit
626-PA-6015	4 Units
626-PA-6018	4 Units
626-PA-6020	4 Units

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

NOTE

When selecting modules for installation into any Series 526 Mainframe, verify that the sum of the load ratings of the installed modules DOES NOT exceed 20.

2.2 CONNECTING POWER SOURCE TO MODULE

2.2.1 Connection Procedure

The 6001 plug-in is supplied with either a barrier type terminal strip under a small cover or with an AC connector located at the rear of the module. Proceed as follows:

a. Insert key in FUNCTION key switch on front panel of mainframe and set switch to OFF position.

b. Turn off AC power to the line that is to be monitored.

c. If a terminal strip is mounted on the rear panel of the 6001, remove the terminal strip safety cover to expose the connections. Now connect the single phase line to the three terminals (two AC leads to upper two terminals and earth ground to the third terminal, as marked). When all connections have been made, be sure to replace the terminal block cover, then reapply AC power.

d. If a connector is installed on the rear panel of the 6001, the AC source to be monitored should be wired to the cable assembly supplied with the module. If the supplied cable is not adequate, the mating connector can be obtained from AMP, Inc. The part numbers are as follows:

Part Number	Description
1-480700-0	Connector Housing
1-640720-0	Strain Relief
350689-1	Socket Contacts

Attach the wired mating connector to the rear panel connector then reapply AC power.

CAUTION

To avoid damaging the equipment, do not apply AC 600V RMS voltages in excess of 600V RMS to the 6001.

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

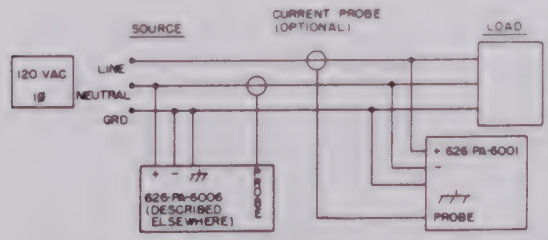
2.2.2 Circuit Applications

WARNING

Connection should be performed only by qualified personnel. Conductors connecting to measurement points should be approved for the specific use. When connected to branch circuits of 20 amperes or less, minimum flexible cord size is No. 18 (1 mm²). For branch circuits with higher ampacity, refer to National Electric Code (ANSI C1-1975 Para. 2404-4 and Para. 250-95). Special consideration of ground may be required. Refer to Article 250 of above reference if in doubt. Outside U.S.A. consult applicable safety standards.

The single phase AC monitor is commonly used alone to monitor a single AC phase, line-to-neutral; or in multiples, to monitor 2Ø or 3Ø in-phase sources. Note that the plug-in monitors only the voltage difference between its + or - inputs, with the ⏚ input acting only as a common grounding point. The ⏚ input is tied to the safety grounding conductor in the 626 power plug, so be careful not to inadvertently contaminate a "clean" computer power ground with a "dirty" building ground.

The single phase AC monitor is frequently used with the built-in impulse duration/direction option. This application is illustrated on the following pages.

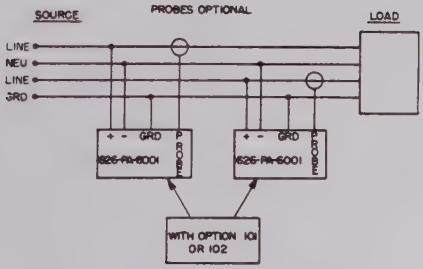


120 VAC Single Phase Connections

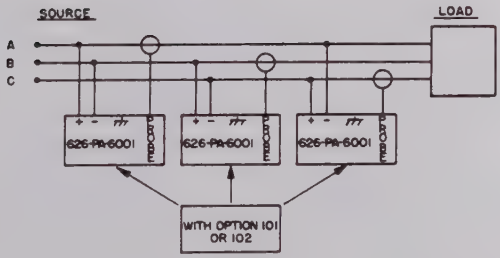
Note

Current probes are included with option 101 or 102 for 626-PA-6001.

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

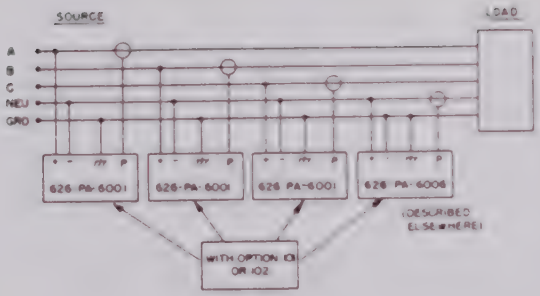


120V/240V Split Phase



3 Phase Delta

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.



3 Phase Wye

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

2.2.3 Installation Guidelines

Proper monitoring and analysis of AC and DC voltage disturbances requires careful attention to the method of connection between the Series 626 Universal Disturbance Analyzer and the monitored circuit. To obtain the most accurate and relevant voltage monitoring data, the following suggested guidelines should be utilized.

1. To minimize spurious impulse transients and interchannel coupling, always use the Dranetz test cables supplied with the 626. If cables are not supplied, such as with the barrier strip input modules, the test cable should be composed of twisted-pair wires for each input channel.

2. Test cable length should be minimized, preferably less than 8 feet from the Series 626 to the circuit connection point. This will minimize amplitude variation of impulse transients.

3. If monitoring a power line connected to critical, sensitive load equipment, the test cable should be connected to the power line as close as possible to the load. For three-phase loads, the 626 should be connected in the same way as the load equipment, i.e. Phase to Phase or Phase to Neutral.

4. Use of instrument-grade potential transformers for monitoring impulses on high voltage power lines is not recommended. The limited frequency response of most potential transformers may result in substantial variation of impulse amplitude.

5. The Series 626 is designed to operate from disturbed power lines. Therefore, the 626 power supply may be connected to the same power source line that is being monitored. However, the user should be aware that the extensive transient suppression incorporated with the 626 power supply may alter the transient characteristics of the AC power line to which the power supply is connected. If the user wishes to prevent alteration of the transient characteristics of the power line being monitored, the 626 power supply input should be separated from the monitored inputs.

6. The ground terminals of the plug-in modules are connected internally to the safety grounding conductor in the 626 power plug. Be careful not to inadvertently contaminate a "clean" ground with a "dirty" ground.

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

2.3 OPERATING THE 6001

2.3.1 Operating Controls and Indicators

The functions of the mainframe operating controls and displays associated with 6001 plug-in operation are described in Table 2-1. Figure 2-1 shows the typical front panel controls and layout with the 6001. For a description of controls common to overall Series 600 operation, refer to Volume 1 (Operator's Manual) of the Series 600 Mainframe Manual.

2.3.2 Selecting the Voltage Range

One of three ranges may be selected which effectively defines the maximum or full scale input voltage. For example, for a RANGE F.S. of 240V, the low limit value may range from 20-239 VAC; the upper limit may range from 21-240 VAC.

Table 2-1. 6001 Plug-In Operating Controls

Item	Function
RANGE key and indicator	When indicator lights, user is free to depress RANGE key and ENTER RANGE F.S. value via numeric keyboard. Printer will prompt values to choose from.
LO LIMIT key	When depressed, enables numeric keyboard to program low limit voltage.
HI LIMIT key	When depressed, enables numeric keyboard to program high limit voltage.
SENS key	When depressed, enables numeric keyboard to program voltage sensitivity value.
IMP SENS key	When depressed, enables numeric keyboard to program impulse voltage sensitivity value.
F SENS	When depressed, enables numeric keyboard to program frequency sensitivity value.
ENTER pushbutton	When depressed, transfers numeric keyboard value into the 6001 memory.

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

Figure 2-1. Series 626 Controls Used by the 6001 Plug-In

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

Table 2-1. 600: Plug-In Operating Controls (Cont'd)

Item	Function
DATA pushbutton	When depressed, produces data summary printout.
PRESET pushbutton	With FUNCTION switch set to PROGRAM and a channel pushbutton (1-5) depressed, depressing PRESET recalls non-volatile factory program for that channel. Only valid when range indicator is lit.

2.3.3 Programming Procedure

Assume it is desired to program a full scale range of 200V, a high limit of 125V, a low limit of 105V, voltage sensitivity of 2 volts, frequency sensitivity of 0.5 Hz and an impulse sensitivity of .20V. Voltage and frequency sensitivity sets the deviation from the present value above or below which a detected value produces a recorded disturbance.

For impulse measurements, the sensitivity corresponds to the absolute threshold, so that for an impulse sensitivity of .20 volts, a disturbance is recorded when impulse amplitude is greater than or equal to 100 volts.

For the example cited, program the 600: as follows:

a. Set FUNCTION switch to PROGRAM.

b. Depress the channel pushbutton (1-5) that corresponds to the slot position of the plug-in to be programmed. Note that a program summary for that channel is immediately printed.

c. Note that the red indicator next to the RANGE pushbutton lights. Depress the RANGE pushbutton. The printer prompts:

Enter one of three ranges: 200, 400, or 600V F.S.

d. Note that three yellow indicators above the numeric keyboard now light. Enter 200, using the keyboard. This selects the first range (20-200 VAC) of the plug-in. As each digit is entered, one indicator goes out. If an error is made, depress CLEAR ENTRY and correct the entry.

e. When the RANGE value has been programmed, the green indicator next to the ENTER pushbutton lights. Depress this pushbutton to enter the value. The RANGE entry (RANGE F.S. 200V) will now be echoed back on the printout.

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

f. When the ENTER indicator goes out, one red indicator above the center bank of pushbuttons lights. This indicates that another function may be programmed.

g. Depress the HI LIMIT pushbutton. Program the high limit value (125) as in step d.

h. When the green ENTER indicator lights, depress the ENTER pushbutton. The programmed high limit value will be echoed back on the printout.

i. Repeat steps f, g and h for the low limit voltage (105V) using the LO LIMIT pushbutton.

j. Repeat steps f, g and h for the voltage sensitivity, using the SENS pushbutton and programming the voltage value as 02.

k. Repeat steps f, g, and h for the frequency sensitivity (0.5Hz), using the F SENS pushbutton and programming the value as 0.5.

l. Repeat steps f, g, and h for the impulse sensitivity (0100 volts), using the IMP SENS pushbutton. The completed program printout should take the following form:

626*		626A*	
IMPULSE SENS	0100V	RANGE F.S.	200V
FREQ SENS	0.5HZ	V HIGH LIMIT	125 V
VOLTAGE SENS	002V	V LOW LIMIT	105 V
V LOW LIMIT	105 V	VOLTAGE SENS	002V
V HIGH LIMIT	125 V	FREQ SENS	0.5HZ
RANGE F.S.	200V	IMPULSE SENS	0100V

NOTE

The instrument is designed to detect an invalid entry and to automatically shift high and low limits if range is changed without reprogramming the limits. If the RANGE value is selected as 200V and the user selects 205V as the low limit value, the printout ENTRY TOO HIGH will appear.

m. When the plug-in program is completed, the user may proceed to program another module (by depressing another channel number) or he may place the instrument on line by setting the FUNCTION switch to OPERATE. While on line, the program in effect may be obtained by simply depressing the PROG pushbutton.

---

*If you are using a Model 626, read (from the bottom up) the "626" printouts in this manual; if you are using a Model 626A, read (from the top down) the "626A" printouts instead.

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

2.4 SELECTING THE FACTORY PRESET PROGRAM

To select the program stored in hard memory, set the PROGRAM switch to PROGRAM and depress the channel number desired. The last operator-set program will be printed out. Now depress the PRESET pushbutton to recall the factory-set program. An example of this sequence appears below. Note that the first program summary printed represents the operator program; the second is the factory program printed after the PRESET pushbutton is depressed.

626

```
IMPULSE SENS   0100V
FREQ SENS     00.5Hz
VOLTAGE SENS   002V
V LOW LIMIT    105 V
V HIGH LIMIT   125 V
RANGE F.S.     200V
     626-PA-6001
          CH 1
PROGRAM SUMMARY

IMPULSE SENS   0025V
FREQ SENS      02.0HZ
VOLTAGE SENS    002 V
V LOW LIMIT    100 V
V HIGH LIMIT   130 V
RANGE F.S.     200V
     626-PA-6001
          CH 1
PROGRAM SUMMARY

 PROGRAM MODE
```

626A

```
 PROGRAM MODE

PROGRAM SUMMARY
     CH 1
  626-PA-6001
RANGE F.S.     200V
V HIGH LIMIT   130 V
V LOW LIMIT    100 V
VOLTAGE SENS   002V
FREQ SENS      02.0HZ
IMPULSE SENS   0025V

PROGRAM SUMMARY
     CH 1
  626-PA-6001
RANGE F.S.     200V
V HIGH LIMIT   125 V
V LOW LIMIT    105 V
VOLTAGE SENS   002V
FREQ SENS     00.5HZ
IMPULSE SENS   0100V
```

2.5 DESCRIPTION OF DATA PRINTOUTS

When any of the disturbances described below is detected by the 6001, it is recorded and displayed in characteristic manner.

COPYRIGHT © 1982, 1983, 1984, 1985, 1986, 1987
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

2.5.1 Overvoltage

An overvoltage condition exists when the monitored power line voltage exceeds the user-specified upper limit for more than 2.55 seconds. The beginning of an overvoltage condition is indicated by a printout such as the following:

```
4   HIGH   12:34:56.78
```

where 4 is the channel number and time is given in hours, minutes and seconds (to .01 sec resolution).

When the line voltage recovers to normal, a printout such as the following occurs:

626			626A		
↑ 4	NORM	12:36:14.56		135.8	V MAX
	135.8	V MAX	4	NORM	12:36:14.56 ↓

indicating when normal voltage was restored and the value of the highest voltage reached during the overvoltage interval.

2.5.2 Undervoltage

An undervoltage condition exists when the monitored power line voltage remains below the user-specified lower limit for more than 2.55 seconds. The beginning of an undervoltage condition is indicated by a printout such as the following:

```
4   LOW   10:09:12.34
```

When the line voltage returns to normal level, a message such as the following is printed:

626			626A		
↑ 4	NORM	10:09:12.34		96.4	V MIN
	96.4	V MIN	4	NORM	10:09:12.34 ↓

indicating when normal voltage was restored and the value of the lowest voltage reached during the undervoltage interval.

2.5.3 Voltage Change

A voltage change printout is triggered when the line voltage changes more than a preselected amount from the last printed value. The voltage change sensitivity is a user-selected integral voltage between one and 15 volts for a 115-volt line. The following example shows several voltage change printouts. The first group shows a voltage increase to 115.4V at the time shown; the second shows a voltage decrease to 109.2V at the time shown.

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

626

```
↑   2  INC   01:02:34.56
       ..5.4 V

    2  DEC   01:02:34.56
       109.2 V
```

626A

```
       115.4 V
2      INC   01:02:34.56

       109.2 V
2      DEC   01:02:34.56
```

2.5.4 Voltage Surge

A Voltage Surge is defined as a line voltage which increases through a user-selected upper limit and then returns to an in-tolerance condition in less than 2.56 seconds. When a surge begins, its starting time is printed as follows:

```
3   HIGH   12:34:50.49
```

When the line voltage returns to a normal level following a surge condition, a message such as the following will be printed:

626

```
↑   3  NORM   12:34:51.59
       139.2  V  MAX
       SURGE 1.10 SEC
```

626A

```
       SURGE 1..0 SEC
       139.2  V  MAX
3      NORM   12:34:51.59
```

In this case, the time at which the voltage returns to normal is shown as well as the maximum voltage reached and the surge duration.

2.5.5 Voltage Sag

A Voltage Sag is defined as a line voltage that decreases below the user-selected lower limit and then returns to an in-tolerance condition in less than 2.56 seconds. Sag printouts take the same form as surge printouts, with the term SAG replacing the term SURGE, and the term MIN replacing the term MAX.

NOTE

Voltage inputs less than 25V RMS will be printed out as 0.0V on the 6001.

2.5.6 Impulses

"Impulse" disturbances represent any line perturbation which contains frequency components in the 300 Hz to 500 kHz range. An impulse type disturbance produces a printout such as the following:

626

```
↑   2  IMP    10:12:13.45
       +0139  V  PK
```

626A

```
       +0139  V  PK
2      IMP    10:12:13.45
```

This printout indicates that an impulse which deviated from normal line voltage by +139 volts peak was detected on channel 2 at the time shown.

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

The impulse magnitude is measured with respect to the instantaneous point on the power frequency sinewave at which it occurs.

2.5.7 Frequency Change

A frequency change printout is triggered when the line frequency changes more than a preselected amount from the last printed value. The frequency change sensitivity is a user-selected value between 0.2 Hz and 3.0 Hz in 0.1 Hz increments. The following example shows several frequency change printouts.

626	626A
3 FREQ 00:05:12.46 059.0 HZ	060.0 HZ 3 FREQ 00:05:10.44
3 FREQ 00:05:10.64 059.5 HZ	059.5 HZ 3 FREQ 00:05:10.64
3 FREQ 00:05:10.44 060.0 HZ	059.0 HZ 3 FREQ 00:05:12.46

2.6 PRINTOUT MODES

The setting of the PRINTOUT MODE switch on the front panel of the mainframe determines how much detail is printed out. Printout data is reduced as the switch is rotated counterclockwise.

The following printout examples show how various settings of the PRINTOUT MODE switch change the amount of detail in the printed record of a disturbance. It is assumed that the disturbances occurred in Channel 1 and that the limits for Channel 1 were programmed as follows:

RANGE F.S.	200 Vrms
V LOW LIMIT	105 Vrms
V HIGH LIMIT	125 Vrms
V SENSITIVITY	2 Vrms

The example printouts are referenced to figures 2-2 and 2-3 which illustrate overvoltage and voltage sag disturbances, respectively.

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

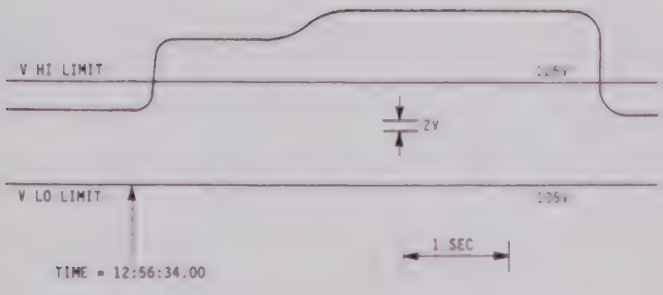


Figure 2-2. Overvoltage Disturbance (6001)

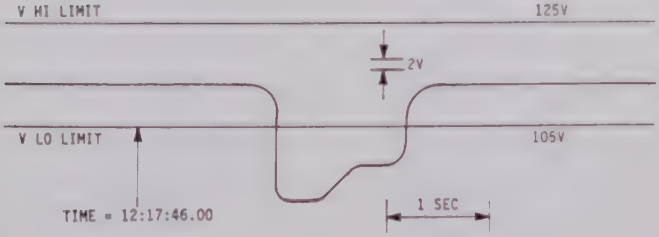


Figure 2-3. Voltage Sag Disturbance (6001)

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

Disturbances which occur while the PRINTOUT MODE switch is in the SUMMARY ONLY position do not generate individual printouts but they are stored in the daily accumulator and are automatically printed each day at midnight (worst case event and number of occurrences in each category). This printout may also be triggered manually by depressing the DATA button.

The first group of generated printouts (below) represent overvoltage conditions (fig. 2-2) in the NORMAL mode. The second illustrates overvoltage (fig. 2-2) in the OUT-OF-LIMITS mode.

626

```
1  NORM  12:56:38.51
   139.1  V  MAX
1  HIGH  12:56:34.21

1  NORM  12:56:38.51
   139.1  V  MAX
1  DEC  12:56:38.50
   130.2  V
1  INC  12:56:35.78
   137.3  V

1  INC  12:56:35.62
   135.3  V

1  INC 12:56:35.40
   133.3  V
1  INC  12:56:34.22
   131.3  V
1  INC  12:56:34.21
   129.2  V
1  HIGH  12:56:34.21
```

626A

```
1  HIGH  12:56:34.21
   129.2  V
1  INC  12:56:34.21
   131.3  V
1  INC  12:56:34.22
   133.3  V
1  INC  12:56:35.40
   135.3  V
1  INC  12:56:35.62
   137.3  V
1  INC  12:56:35.78
   130.2  V
1  DEC  12:56:38.50
   139.1  V  MAX
1  NORM  12:56:38.51

1  HIGH  12:56:34.21
   139.1  V  MAX
1  NORM  12:56:38.51
```


COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

The following is a printout of overvoltage (fig. 2-2) in the MAXIMUM DETAIL mode.

626

```
.  DEC   12:56:38.61
   119.8  V
.  DEC   12:56:38.53
   121.8  V
.  DEC   12:56:38.51
   124.0  V
.  NORM  12::56:38.51
   129.1  V  MAX
.  DEC   12:56:38.50
   130.2  V
.  INC   12:56:35.78
   137.3
.  INC   12:56:35.62
   135.3  V
1  INC   12:56:35.40
   133.3  V
.  INC   12:56:34.22
   131.3  V
1  INC   12:56:34.21
   129.2  V
1  HIGH  12:56:34.21
1  INC   12:56:34.20
   121.1  V
1  INC   12:50:12.34
   119.0  V
```

626A

```
   119.0  V
1  INC   12:50:12.34
   121.1  V
1  INC   12:56:34.20
1  HIGH  12:56:34.21
   129.2  V
1  INC   12:56:34.21
   131.3  V
1  INC   12:56:34.22
   133.3  V
.  INC   12:56:35.40
   135.3  V
1  INC   12:56:35.62
   137.3  V
1  INC   12:56:35.78
   130.2  V
1  DEC   12:56:38.50
   129.1  V
1  NORM  12:56:38.51
   124.0  V
1  DEC   12:56:38.51
   121.8  V
1  DEC   12:56:38.53
   119.8  V
1  DEC   12:56:38.61
```

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

The first group of generated printouts below illustrates voltage sag (fig. 2-3) in the NORMAL mode. The second group illustrates voltage sag (fig. 2-3) in the OUT-OF-LIMITS ONLY mode.

626

```
1  NOR   12:17:48.61
      090.1  V  MIN
      SAG  1.25 SEC

1  LOW   12:17:47.36


1  NORM  12:17:48.61
      090.1  V  MIN
      SAG  1.25 SEC

1  INC   12:17:48.60
      103.1  V

1  INC  12:17:48.55
      098.0  V

1  INC   12:17:48.05
      096.0  V

1  INC   12:17:47.96
      094.0  V

1  DEC   12:17:47.39
      091.9  V

1  DEC   12:17:47.37
      094.1  V

1  DEC   12:17:47.36
      101.3  V

1  LOW   12:17:47.36
```

626A

```
1  LOW    12:17:47.36

      101.3   V
1  DEC    12:17:47.36

      094.1   V
1  DEC    12:17:47.37

      091.9   V
1  DEC    12:17:47.39

      094.0   V
1  INC    12:17:47.96

      096.0   V
1  INC    12:17:48.05

      098.0   V
1  INC    12:17:48.55

      103.1   V
1  INC    12:17:48.60

      SAG   1.25 SEC
      090.1   V  MIN
1  NORM   12:17:48.61


1   LOW   12:17:47.36

      SAG  1.25 SEC
      090.1   V   MIN
1   NOR   12:17:48.61
```


COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

The following printout illustrates what state sag (fig. 2-3) in the MAXIMUM DETAIL mode.

626

```
.  INC   12:27:48.86
   112.1  V

.  INC   12:17:48.69
   110.0  V

1  INC   12:17:48.62
   108.1  V

.  INC   12:17:48.61
   105.9

1  NORM  12:17:48.61
   090.1  V  MIN
   SAG   1.25  SEC

1  INC   12:17:48.60
   103.1  V

.  INC   12:17:48.55
   098.0  V

1  INC   12:17:48.05
   096.0  V

1  INC   12:17:47.96
   094.0  V

1  DEC   12:17:47.39
   091.9  V

1  DEC   12:17:47.37
   094.1  V

1  DEC   12:17:47.36
   101.3  V

1  LOW   12:17:47.36

1  DEC   12:17:47.35
   110.8  V

1  INC   12:16:32.15
   113.0  V
```

626A

```
   113.0  V
1  INC   12:16:32.15

   110.8  V
1  DEC   12:17:47.35

.  LOW   12:17:47.36

   101.3  V
.  DEC   12:17:47.36

   094.1  V
1  DEC   12:17:47.37

   091.9  V
.  DEC   12:17:47.39

   094.0  V
1  INC   12:17:47.96

   096.0  V
.  INC   12:17:48.05

   098.0  V
.  INC   12:17:48.55

   103.1  V
1  INC   12:17:48.60

   SAG   1.25  SEC
   090.1  V  MIN
1  NORM  12:17:48.61

   105.9  V
1  INC   12:17:48.61

   108.1  V
1  INC   12:17:48.62

   110.0  V
1  INC   12:17:48.69

   112.1  V
1  INC   12:27:48.86
```

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

SECTION III

OPERATIONAL TEST

3.1 GENERAL

This section provides information for performing an operational test to verify that the 6001 plug-in is operating properly.

3.2 SYSTEM CHECK

When the PRINTOUT MODE switch is set to SYSTEM CHECK, a source of precise signals is applied to the front end circuitry of the 6001. Any inputs that are connected at this time will be automatically disconnected for the system check period. These signals fully verify the operational integrity of the module. A typical system check printout, as well as the system check signals and the allowable tolerance levels are shown below.

626	626A
**********	***SYSTEM CHECK***
PRESENT F 059.7 HZ	TIME = 00:00:12.26
PRESENT V 119.6 V	
IMP + 0160 V PK	CH 5
626-PA-6001	626-PA-6001
CH 5	IMP + 0160 V PK
	PRESENT V 119.6 V
TIME = 00:00:12.26	PRESENT F 059.7 HZ
SYSTEM CHECK	**********

3.3 SYSTEM CHECK SIGNALS

Impulse:	+160V pk
Voltage:	120.0 Vrms
Frequency:	
626-PA-6001 -1,2	60 Hz
626-PA-6001 -3,4	50 Hz

3.4 SYSTEM CHECK TOLERANCES

F.S. RANGE	IMPULSE	VOLTAGE	FREQUENCY
200	+134 to +186 Vpk	118.4 to 121.6V	48.8 to 50.2 Hz 59.8 to 60.2 Hz
400	+124 to +196 Vpk	118.0 to 122.0V	49.8 to 50.2 Hz 59.9 to 60.2 Hz
600	+114 to +206 Vpk	117.6 to 122.4V	49.8 to 50.2 Hz 59.8 to 60.2 Hz

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

APPENDIX A. IMPULSE DURATION DISPLAY OPTION, OPTION .1, FOR 626-PA-600. PLUG-IN NOT COMPATIBLE WITH OPTION .0

A.1 INTRODUCTION

The following paragraphs describe the differences between the 600, plug-in with Option .0, and the standard 600, plug-in.

NOTE

The following data supersedes that found in previous paragraphs of this manual unless otherwise stated.

A.2 PURPOSE

Option .0 has no effect on the line frequency measurements of the 600, described in previous paragraphs. It also does not affect the measurement of impulse polarity and peak voltage. Option .1 is designed to provide information on impulse duration. In addition, if the current probe is used, direction of origin will be determined for impulses having a current of 3 amperes or greater at the time of measurement.

A.3 EQUIPMENT CHARACTERISTICS

Technical specifications for Option .0 are listed in Table A-1. All specifications for the 600, listed in Table 1-1, still apply.

Table A-1. 626-PA-600, Option 10, Technical Specifications

IMPULSE DURATION

Range: 1 uSec to 1023 uSec

Accuracy: ±6% of reading ±0.3% F.S. for 1/2 sinewave pulses up to 100 uSec duration greater than 100 Vpk.*

Typically

-10% at 200 uSec, -20% at 400 uSec, -50% at 1000 uSec.

* 100 Vpk on 200 Vrms Range
200 Vpk on 400 Vrms Range
400 Vpk on 600 Vrms Range

Timing Reference Points: Start at 25V** - stop at 30% of Vpk.

** 25V on 200 Vrms Range
50V on 400 Vrms Range
100V on 600 Vrms Range

COPYRIGHT © 1982, 1983, 1984, 1985, 1986, 1987
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

Table A-1. 626-PA-6001 Option 101 Technical Specifications (Cont'd.)

Minimum Impulse Voltage:	50 Vpk on 200 Vrms Range 100 Vpk on 400 Vrms Range 200 Vpk on 600 Vrms Range

IMPULSE DIRECTION OF ORIGIN

Minimum Impulse Current:	3 Amp for 0.1 uSec before and after measurement
Minimum Impulse Voltages:	50 Vpk on 200 Vrms Range 100 Vpk on 400 Vrms Range 200 Vpk on 600 Vrms Range
Maximum Line Frequency Current:	250 A rms

A.4 INSTALLATION IN MAINFRAME

The module is installed in the mainframe in the same manner as the standard 6001 (par. 2.1).

A.5 CONNECTIONS TO THE MODULE

Connecting the 6001 to the line to be monitored is the same as described in paragraph 2.2. If impulse direction information is required, the current probe must be connected in the following manner:

a.) Turn off AC power to the line that is to be monitored.

b.) Attach the current probe connector to its mating connector on the rear panel of the 6001.

c.) Install current probe on the line which is connected to the "+" voltage terminal of the corresponding channel. Be sure that the arrow on the current probe points from the source to the load. Proper connections are shown in Figure A-1.

d.) Reapply AC power.

A.6 OPERATING THE 6001 WITH OPTION 101

Operation of the 6001 with Option 101 requires no additional programming steps. Programming is the same as described in paragraph 2.3.3.

COPYRIGHT © 1982, 1983, 1984, 1985, 1986, 1987
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

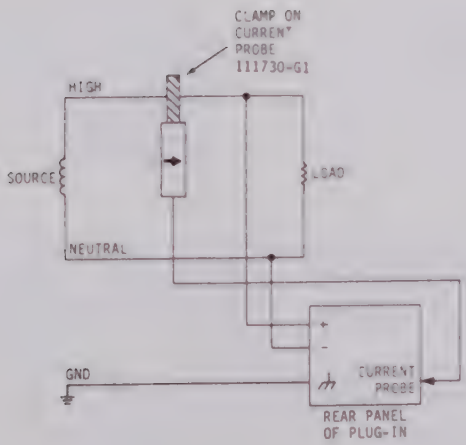


Figure A-1. Proper Connections of 626-PA-6001 for Use with Current Probe

COPYRIGHT © 1982, 1983, 1984, 1985, 1986, 1987
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

A.7 DESCRIPTION OF DATA PRINTOUTS

The only printouts affected by the addition of Option 101 are those for module identification and impulse data.

PROGRAM SUMMARY

When the Program Summary key (designated "PROG") is depressed, the module will be identified as a 626-PA-6001R1 as in the following example.

626	626A
IMPULSE SENS 0100V	PROGRAM SUMMARY
FREQ SENS 00.5Hz	11/17/83 13:43:25
VOLTAGE SENS 002V	CH1
V LOW LIMIT 105V	626-PA-6001R1
V HIGH LIMIT 125V	RANGE F.S. 200V
RANGE F.S. 200V	V HIGH LIMIT 125V
626-PA-6001R1	V LOW LIMIT 105V
CH1	VOLTAGE SENS 002V
11/17/83 13:43:25	FREQ SENS 00.5HZ
PROGRAM SUMMARY	IMPULSE SENS 0100V

IMPULSE

When used with the 200V FS range, a minimum impulse voltage of 50 Vpk is required to obtain duration data. For information on the direction of origin, a minimum impulse voltage of 50 Vpk and a minimum impulse current of 3 Amps is required. These minimum voltage levels increase with range, as shown in Table A-1, but the minimum current required is not affected.

If the current probe is not used, or if it is used but the impulse current is less than 3 Amps at the time of measurement, the printout will take on the following form:

626	626A
4 IMP 12:34:56.88	+2057V, 089uS
+2057V, 089uS	4 IMP 12:34:56.88

This printout indicates that an impulse which deviated from the normal line voltage for 89 microseconds with a peak voltage of 2057 volts was detected on channel 4 at the time shown. The "+" preceding the impulse voltage indicates that the impulse was positive with respect to the "-" or neutral terminal on the 6001 rear panel.

COPYRIGHT C 1982, 1983, 1984, 1985, 1986, 1987
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

IMPULSE WITH DIRECTION

When the current probe is used and the probe [illegible] Amps at the time of measurement, the printout will have the following form:

626	626A
↑ 4 IMP 12:34:57.00	[illegible]
+2057V, LOAD, 089uS	4 IMP 12:34:57.00 ↓

This printout indicates that an impulse originating from the load, of +2057 volts peak and 89 microseconds in duration, occurred at the time shown. If the direction had been from the source, SRC would be printed in place of LOAD in the example.

Figure A-2 illustrates an impulse duration measurement.

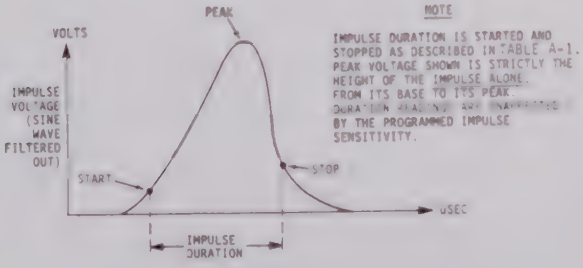

PEAK
VOLTS
IMPULSE VOLTAGE (SINE WAVE FILTERED OUT)
START
STOP
uSEC
IMPULSE DURATION
NOTE
IMPULSE DURATION IS STARTED AND STOPPED AS DESCRIBED IN TABLE A-1.
PEAK VOLTAGE SHOWN IS STRICTLY THE HEIGHT OF THE IMPULSE ALONE, FROM ITS BASE TO ITS PEAK.
DURATION READINGS ARE UNAFFECTED BY THE PROGRAMMED IMPULSE SENSITIVITY.

Figure A-2. Impulse Duration Measurement

A.8 PRINTOUT MODES

Printout modes and calibration signals remain the same as in the standard 6001 described in paragraph 2.6.

COPYRIGHT © 1982, 1983, 1984, 1985, 1986, 1987
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

APPENDIX B. IMPULSE STRENGTH (OPTION 102) FOR 626-PA-6001 PLUG-IN NOT COMPATIBLE WITH OPTION 102

B.1 INTRODUCTION

The following paragraphs describe the differences between the 626-PA-6001 plug-in with Option 102 and the standard 6001 plug-in.

NOTE

The following data supersedes that found in Sections I through III unless otherwise stated.

B.2 PURPOSE

Option 102 has no effect on the line frequency measurements of the 6001 previously described. It also does not affect the measurement of impulse polarity and peak voltage. Option 102 is designed to provide information on impulse strength. In addition, if the current probe is used, direction of origin will be determined for impulses having a current of 3 Amps or greater at the time of measurement.

B.3 EQUIPMENT CHARACTERISTICS

Technical specifications for Option 102 are listed in Table B-1. All specifications for the 6001, listed in Table B-1, still apply.

Table B-1. 626-PA-6001 Option 102 Technical Specifications

IMPULSE STRENGTH

Ranges:

200V F.S. Range	0.0002 to 0.2046 V-Sec
400V F.S. Range	0.0004 to 0.4092 V-Sec
600V F.S. Range	0.0008 to 0.8184 V-Sec

Accuracy: ±10% of reading, ±0.1% of F.S. for 1/2 sinewave pulses up to 100 uSec duration greater than 100 Vpk*. Typically -20% at 200 uSec, -50% at 500 uSec.

* 100 Vpk on 200V F.S. Range
200 Vpk on 400V F.S. Range
400 Vpk on 600V F.S. Range

Timing Reference Points: Start at 25V** - stop at 30% of Vpk.

** 25V on 200 Vrms Range
50V on 400 Vrms Range
100V on 600 Vrms Range

COPYRIGHT © 1982, 1983, 1984, 1985, 1986, 1987
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

Table B-1. 626-PA-6001 Option 102 Technical Specifications (Cont'd)

IMPULSE DIRECTION OF ORIGIN

Minimum Impulse Current: 3 Amps for 0.1 uSec before and after measurement.

Minimum Impulse Voltages: 50 Vpk on 200 Vrms Range
100 Vpk on 400 Vrms Range
200 Vpk on 600 Vrms Range

Maximum Line Frequency Current: 250 A rms

B.4 INSTALLATION IN MAINFRAME

The module is installed in the mainframe in the same manner as the standard 6001 described in paragraph 2.1.

B.5 CONNECTIONS TO THE MODULE

Connecting the 6001 to the line to be monitored is the same as described in paragraph 2.2. If impulse direction information is required, the current probe must be connected in the following manner.

a.) Turn off AC power to the line that is to be monitored.

b.) Attach the current probe connector to its mating connector on the rear panel of the 6001.

c.) Install current probe on the line which is connected to the "+" voltage terminal of the corresponding channel. Be sure that the arrow on the current probe points from the source to the load. Proper connections are shown in Figure A-1.

d.) Reapply AC power.

B.6 OPERATING THE 6001 WITH OPTION 102

Operation of the 6001 with Option 102 requires no additional programming steps; programming is the same as described in paragraph 2.3.3.

B.7 DESCRIPTION OF DATA PRINTOUTS

The only printouts affected by the addition of Option 102 are those for module identification and impulse data.

PROGRAM SUMMARY

When the Program Summary key (designated "PROG" is depressed, the module will be identified as a 626-PA-6001R2 as in the following example.

COPYRIGHT © 1982, 1983, 1984, 1985, 1986, 1987
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

626

```
IMPULSE SENS      0100V
FREQ SENS         [illegible]
VOLTAGE SENS      002V
V LOW LIMIT       105V
V HIGH LIMIT      125V
RANGE F.S.        200V
   626-PA-6001R2
        CH1
11/17/83     13:55:30
  PROGRAM SUMMARY
```

626A

```
   PROGRAM SUMMARY
[illegible]
        CH1
   626-PA-6001R2
RANGE F.S.        200V
V HIGH LIMIT      125V
V LOW LIMIT       105V
VOLTAGE SENS      002V
FREQ SENS         005 HZ
IMPULSE SENS      0100V
```

IMPULSE

When used with the 200V FS range, a minimum impulse voltage of 50 Vpk is required to obtain strength data. For information on the direction of origin, a minimum impulse voltage of 50 Vpk and a minimum impulse current of 3 Amps is required. These minimum voltage levels increase with range, as shown in Table B-1, but the minimum current required is not affected.

If the current probe is not used, or if it is used but the impulse current is less than 3 Amps at the time of measurement, the printout will take on the following form:

626

```
4 IMP 12:34:56.88
0.0156 V-SEC
+2057V
```

626A

```
+2057V
0.0156 V-SEC
4 IMP 12:34:56.88
```

This printout indicates that an impulse which deviated from the normal line voltage with a strength of 0.0156V-Sec and a peak voltage of 2057 volts was detected on channel 4 at the time shown. The "+" preceding the impulse voltage indicates that the impulse was positive with respect to the "-" or neutral terminal on the 6001 rear panel.

Figure B-1 illustrates an impulse strength measurement.

IMPULSE WITH DIRECTION

When the current probe is used and the impulse current is greater than 3 Amp at the time of measurement, the printout will take the following form:

626

```
4 IMP 12:34:57.00
0.0156 V-SEC
+2057V, LOAD
```

626A

```
+2057V, LOAD
0.0156 V-SEC
4 IMP 12:34:57.00
```

COPYRIGHT © 1982, 1983, 1984, 1985, 1986, 1987
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

This printout indicates that an impulse originating from the load, of +2057 volts peak and an area of 0.0156V-Sec, occurred at the time shown. If the direction had been from the source, SRCE would be printed in place of LOAD in the example.

B.8 PRINTOUT MODES

Printout modes and calibration signals remain the same as in the standard 6001 described in paragraph 2.6.

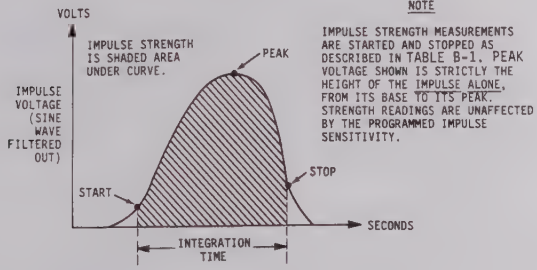

VOLTS
IMPULSE STRENGTH IS SHADED AREA UNDER CURVE.
PEAK
IMPULSE VOLTAGE (SINE WAVE FILTERED OUT)
START
STOP
SECONDS
INTEGRATION TIME
NOTE
IMPULSE STRENGTH MEASUREMENTS ARE STARTED AND STOPPED AS DESCRIBED IN TABLE B-1. PEAK VOLTAGE SHOWN IS STRICTLY THE HEIGHT OF THE IMPULSE ALONE, FROM ITS BASE TO ITS PEAK. STRENGTH READINGS ARE UNAFFECTED BY THE PROGRAMMED IMPULSE SENSITIVITY.

Figure B-1. Impulse Strength Measurement

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

WARNING

Because of possible shock hazards, connection of this equipment should be performed in compliance with the National Electrical Code (ANSI C1) and/or any other requirements which may be applicable to the user.

Installation, operation, and maintenance should be performed only by qualified personnel.

TM-110385-1U

VOLUME I

OPERATOR'S MANUAL

626-PA-6002A

DC MONITOR

NOTE: Refer to Volume 2 (Service Manual) of TM-110385-1U for maintenance data.

1 May 1984
(Rev. 1 September 1985)
(Rev. 1 May 1986)
(Rev. 1 October 1986)

© COPYRIGHT 1982, 1983, 1984, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. EDISON, NEW JERSEY.
ALL RIGHTS RESERVED.

DRANETZ

DRANETZ TECHNOLOGIES, INC.
1000 New Durham Rd., PO Box 4019
Edison, New Jersey 08818-4019

NOTICE CONCERNING DRANETZ' PROPRIETARY RIGHTS

This publication contains information proprietary to Dranetz Technologies, Inc. By accepting and using this manual, the user agrees that the information contained herein will be used solely for the purpose of repairing or operating equipment of Dranetz Technologies, Inc. These manuals are to be returned to Dranetz Technologies, Inc. when no longer required by the user, or when there is a change in ownership of the equipment.

These publications are protected under the Copyright laws of the United States Title 17 et seq. No part of this publication may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language or computer language, in any form, by any means, electronic, mechanical, magnetic, optical, chemical, manual, or otherwise, without the expressed written consent of Dranetz Technologies, Incorporated, 1000 New Durham Road, PO Box 4019, Edison, New Jersey 08818-4019.

TABLE OF CONTENTS

424-PA-6002A DC MONITOR

VOLUME 1

Section		Page
I	GENERAL INFORMATION	
1.1	Scope	1-1
1.2	Introduction	1-1
1.3	Purpose	1-1
1.4	Equipment Characteristics	1-2
1.5	Standard Accessories	1-3
1.6	Optional Accessories	1-4
1.7	Factory Repair	1-4
II	INSTALLATION AND OPERATION	
2.1	Installation	2-1
2.1.1	Load Ratings	2-1
2.2	Connecting DC Power Source to Module	2-2
2.2.1	Connection Procedure	2-2
2.2.2	Circuit Applications	2-3
2.2.3	Installation Guidelines	2-5
2.3	Operating the 6002A	2-6
2.3.1	Operating Controls and Indicators	2-6
2.3.2	Programming Procedure	2-8
2.4	Selecting the Factory Preset Program	2-9
2.5	Description of Data Printouts	2-10
2.5.1	Overvoltage	2-10
2.5.2	Undervoltage	2-10
2.5.3	Voltage Change	2-10
2.5.4	Voltage Surge	2-11
2.5.5	Voltage Sag	2-11
2.5.6	Impulses	2-11
2.6	Printout Modes	2-12
III.	OPERATIONAL TEST	
3.1	General	3-1
3.2	System Check	3-1
3.3	System Check Signals	3-1
3.4	System Check Tolerances	3-1
APPENDIX A.	Impulse Duration Option, Option 101	A-1
APPENDIX B.	Impulse Strength Option, Option 102	B-1

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. EDISON, NEW JERSEY.
ALL RIGHTS RESERVED.

LIST OF ILLUSTRATIONS

Figure		Page
2-1	Series 626 Controls Used by the 6002A Plug-In	2-7
2-2	Overvoltage Disturbance (6002A)	2-14
2-3	Voltage Sag Disturbance (6002A)	2-14
A-1	Impulse Duration Measurement	A-3
B-1	Impulse Strength Measurement	B-3

LIST OF TABLES

Table		Page
1-1	626-PA-6002A Technical Specifications	1-2
2-1	6002A Operating Controls	2-6
A-1	626-PA-6002A Option 101 Technical Specifications	A-1
B-1	626-PA-6002A Option 102 Technical Specifications	B-1

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. EDISON, NEW JERSEY.
ALL RIGHTS RESERVED.

STATEMENT OF WARRANTY

ALL PRODUCTS OF ORANETZ TECHNOLOGIES, INC. ARE WARRANTED TO THE ORIGINAL PURCHASER AGAINST DEFECTIVE MATERIAL AND WORKMANSHIP FOR A PERIOD OF ONE YEAR FROM THE DATE OF DELIVERY. ORANETZ WILL REPAIR OR REPLACE, AT ITS OPTION, ALL DEFECTIVE EQUIPMENT RETURNED, FREIGHT PREPAID, DURING THE WARRANTY PERIOD, WITHOUT CHARGE FOR REPAIR, PROVIDED THERE IS NO EVIDENCE THAT THE EQUIPMENT HAS BEEN MISHANDLED OR ABUSED.

NOTE

The information in this manual has been reviewed and is believed to be entirely reliable. However, no responsibility is assumed for any inaccuracies. The material in this manual is for information purposes only, and is subject to change without notice.

VOLUME 1
OPERATOR'S MANUAL

626-PA-6002A DC MONITOR

SECTION I
GENERAL INFORMATION

1.1 SCOPE

This manual consists of two volumes. Volume 1, the Operator's manual, consists of three sections: I) GENERAL INFORMATION, II) INSTALLATION AND OPERATION, and III) OPERATIONAL TEST. In addition, Appendices A and B cover Options 101 and 102, respectively, for the 6002A Plug-in. Volume 2, the Service manual, contains the maintenance instructions (sections IV thru VII).

1.2 INTRODUCTION

This manual provides operating instructions for the 626-PA-6002A DC Monitor Plug-in, hereinafter referred to as the 6002A. The 6002A is designed for installation in the Series 626 Universal Disturbance Analyzer. It is assumed that the reader is familiar with the mainframe information described in Volume 1 of the Series 626 mainframe manual.

1.3 PURPOSE

The 6002A monitors disturbances on DC power buses. This single channel unit has an overall range of 0.5 to to 80 VDC, programmable in three ranges. With thresholds programmed by the user, the 6002A stores, analyzes, classifies and prints out quantitative and qualitative disturbance data. Accompanying the data is a printout of the time derived from a highly accurate crystal-controlled 24-hour clock in the mainframe.

The 6002A monitors two types of disturbances: DC power bus transients and waveform disturbances. Power bus transients are divided into five display categories: overvoltage, undervoltage, voltage change, voltage surge and voltage sag. Waveform disturbances, identified as "impulses" include all conditions that cause the power bus waveform to deviate from an ideal (flat) waveform. The threshold value of each type of disturbance, above which detection and printout occurs, is operator programmable. Except for an automatic summary printout at the end of each day, disturbance data is normally printed out only when disturbances occur. In an alternate mode, a disturbance data summary printout occurs only at the end of each day. This feature permits long term unattended operation.

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. EDISON, NEW JERSEY.
ALL RIGHTS RESERVED.

The threshold program may be easily altered, using the front panel switches. Cueing indicators adjacent to the programming switches simplify the programming procedure. A back-up program for the plug-in, stored in hard memory at the factory, may always be recalled upon operator demand. Both the program and the disturbance data in the data accumulators may be printed out upon demand.

1.4 EQUIPMENT CHARACTERISTICS

The 6002A is configured as a plug-in module 6.5" high by 1.25" wide by 10" deep. It is designed for installation in any of the five slots of the Series 626 Universal Disturbance Analyzer. Technical specifications of the Series 626 Universal Disturbance Analyzer are listed in Table 1-1.

Table 1-1. 626-PA-6002A Specifications

Input	2-wire differential Z_{in} = 10 meg plus 500 pf (each side to ground)
Overall Voltage Ranges	0.5 to 20V 1.0 to 40V 2.0 to 80V
User set voltage lower spec limit (0.1V increments)	
20V Range	0.5 to 19.9V
40V Range	1.0 to 39.8V
80V Range	2.0 to 79.6V
User set voltage upper spec limit (0.1V increments)	
20V Range	0.6 to 20.0V
40V Range	1.2 to 40.0V
80V Range	2.4 to 80.0V
Voltage Change Sensitivity (0.1V increments)	
20V Range	0.1 to 5.0V
40V Range	0.2 to 10V
80V Range	0.4 to 20V
Voltage Measurement Accuracy	±1% of reading ±0.5% of F.S.

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. EDISON, NEW JERSEY.
ALL RIGHTS RESERVED.

Table 1-1. 626-PA-6002A Specifications (cont'd.)

Voltage Measurement Resolution	
20V Range	0.04V
40V Range	0.08V
80V Range	0.16V
Impulse Ranges (2 mSec to 1 uSec)	
20V Range	0.5 to 20V
40V Range	1.0 to 40V
80V Range	2.0 to 80V
Impulse Thresholds (0.1 volt increments)	
20V Range	0.5 to 20V
40V Range	1.0 to 40V
80V Range	2.0 to 80V
Impulse Accuracy	±5% of reading ±1% F.S. for half-sinewave impulses 10 uSeconds in duration regardless of polarity or grounding. Error increases to ±10% of reading, ±1% F.S. at 5 uSec and 50 uSec pulse durations, and is typically -6 dB at 2 mSEc and 1 uSec pulse durations.

1.5 STANDARD ACCESSORIES

Model No.	Part No.	Quantity	Description
626PA6002A1 Barrier Block Version	TM-110385-1U (Vol. 1)	1	Operator's Manual
626PA6002A2 Connector Version	TM-110385-1U (Vol. 1)	1	Operator's Manual
	110475	1	D.C. Cable

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. EDISON, NEW JERSEY.
ALL RIGHTS RESERVED.

1.6 OPTIONAL ACCESSORIES

Part No.	Quantity	Description
TM-110385-1U (Vol. 2)	1	Service (Maintenance) Manual

1.7 FACTORY REPAIR

When factory repair is desired, proceed as follows:

1. Contact the Dranetz Service Corporation (formerly Dranetz Technologies, Inc., Customer Service Department) in order to obtain an Authorization Number for factory repair.

Telephone: (201) 755-7081

TWX: (710) 997-9553

Telex: 499-7808

Cable: DRANETZ

2. Fill out the REPAIR/SERVICE ORDER enclosed in the Series 626 Operating manual. Ship it along with the malfunctioning equipment to the Dranetz Service Corporation.

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. EDISON, NEW JERSEY.
ALL RIGHTS RESERVED.

SECTION II
INSTALLATION AND OPERATION

2.1 INSTALLATION

To install the 6002A in the mainframe, proceed as follows:

CAUTION: Be sure 626 is turned off and that all power connected to all plug-in modules is turned off.

a. Position the top and bottom front corners of the plug-in module in the upper and lower tracks at the desired slot position at the rear of the mainframe.

b. Carefully slide the module into the mainframe until it is firmly seated.

c. Tighten the top and bottom captive screws to secure the module to the mainframe.

2.1.1 LOAD RATINGS

The Series 626 standard mainframe has an upper limit of the total load rating of the installed modules. The overall mainframe capacity is set at 20 units, and individual modules have load ratings as follows:

Plug-In	Load Rating
626-PA-6001	2 Units
626-PA-6001 With Extra Option Board	3 Units
626-PA-6002	2 Units
626-PA-6003	4 Units
626-PA-6005	2 Units
626-PA-6006	2 Units
626-PA-6007	1 Unit
626-PA-6008	2 Units
626-PA-6009	4 Units
626-PA-6011	1 Unit
626-PA-6012	2 Units
626-PA-6012A	3 Units
626-PA-6013	2 Units
626-PA-6014	1 Unit
626-PA-6015	4 Units
626-PA-6018	4 Units
626-PA-6020	4 Units

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. EDISON, NEW JERSEY.
ALL RIGHTS RESERVED.

NOTE

When selecting modules for installation in any mainframe, verify that the sum of the load ratings of the installed modules DOES NOT exceed 20.

2.2 CONNECTING DC POWER SOURCE TO MODULE

2.2.1 Connection Procedure

The 6002A is supplied with a barrier type terminal strip under a small cover (626-PA-6002A-1) or with a 3 pin connector (626-PA-6002A-2) located at the rear of the module. Proceed as follows:

a. Insert key in FUNCTION key switch on front panel of mainframe and set switch to OFF position.

b. Turn off DC power source that is to be monitored by the module.

c. Remove the terminal strip safety cover to expose the connections. Now connect the DC line to the three power terminals (positive DC to the (+); negative to the (-), and earth ground to the third terminal, as marked). When all connections have been made, be sure to replace the terminal block cover, then reapply DC power.

d. If a 3 pin connector is installed on the rear panel of the 6002A, the DC source to be monitored should be wired to the cable assembly (DTI P/N 110475) supplied with the module. If the supplied cable is not adequate, the mating 3-pin connector can be obtained from AMP, Inc. The part numbers are as follows:

Part Number	Description
1-480700-0	Connector Housing
1-640720-0	Strain Relief
350690-1	Pin Contacts

Attach mating connector to rear panel connector then reapply DC power.

CAUTION

To avoid damaging the equipment, do not apply DC voltages in excess of 100V peak to the 6002A.

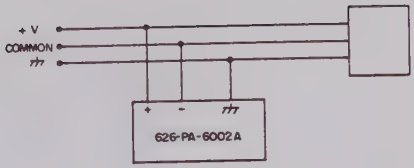
COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. EDISON, NEW JERSEY.
ALL RIGHTS RESERVED.

2.2.2 Circuit Applications

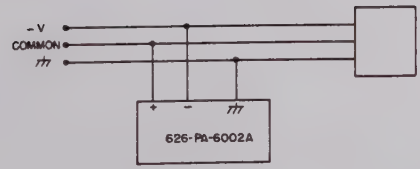
WARNING

Connection should only be performed by qualified personnel. Conductors connecting to measurement points should be approved for the specific use. When connected to branch circuits of 30 amperes or less, minimum flexible cord size is No. 18 AWG (0.8 mm²). For branch circuits with higher ampacity, refer to National Electric Code (ANSI C1-1975 Para. 240-4 and Para. 250-95). Special consideration of ground may be required. Refer to Article 250 of above reference if in doubt. Outside U.S.A. consult applicable safety standards.

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. EDISON, NEW JERSEY.
ALL RIGHTS RESERVED.



Connection to Positive DC Sources



Connection to Negative DC Sources

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. EDISON, NEW JERSEY.
ALL RIGHTS RESERVED.

2.2.3 Installation Guidelines

Proper monitoring and analysis of AC and DC voltage disturbances requires careful attention to the method of connection between the Series 626 Universal Disturbance Analyzer and the monitored circuits. To obtain the most accurate and relevant voltage monitoring data, the following suggested guidelines should be utilized.

1. To minimize spurious impulse transients and interchannel coupling, always use the Dranetz test cables supplied with the 626. If cables are not supplied, such as with the barrier strip input modules, the test cable should be composed of twisted-pair wires for each input channel.

2. Test cable length should be minimized, preferably less than 3 feet from the Series 626 to the circuit connection point. This will minimize amplitude variation of impulse transients.

3. If monitoring a power line connected to critical, sensitive load equipment, the test cable should be connected to the power line as close as possible to the load. For three-phase loads, the 626 should be connected in the same way as the load equipment, i.e. Phase to Phase or Phase to Neutral.

4. Use of instrument-grade potential transformers for monitoring impulses on high voltage power lines is not recommended. The limited frequency response of most potential transformers may result in substantial variation of impulse amplitude.

5. The Series 626 is designed to operate from disturbed power lines. Therefore, the 626 power supply may be connected to the same power line that is being monitored. However, the user should be aware that the extensive transient suppression incorporated with the 626 power supply may alter the transient characteristics of the AC power line to which the power supply is connected. If the user wishes to prevent alteration of the transient characteristics of the power line being monitored, the 626 power supply input should be separated from the monitored inputs.

6. The ground terminals of the plug-in modules are connected internally to the safety grounding conductor in the 626 power plug. Be careful not to inadvertently contaminate a "clean" ground with a "dirty" ground.

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. EDISON, NEW JERSEY.
ALL RIGHTS RESERVED.

2.3 OPERATING THE 6002A

2.3.1 Operating Controls and Indicators

The functions of the mainframe operating controls and indicators associated with 6002A operation are described in Table 2-1. Figure 2-1 shows the Series 626 controls used by the 6002A plug-in. For a description of controls common to overall Series 626 operation, refer to Volume 1 of the Series 626 Mainframe manual.

Table 2-1. 6002A Operating Controls

Item	Function
RANGE key and indicator	When indicator lights, user is cued to depress RANGE key and enter the desired full scale voltage range (20, 40, or 90) via the numeric keyboard.
LO LIMIT key	When depressed, enables numeric keyboard to program low limit voltage.
HIGH LIMIT key	When depressed, enables numeric keyboard to program high limit voltage.
SENS key	When depressed, enables numeric keyboard to program voltage sensitivity value.
IMP SENS key	When depressed, transfers numeric keyboard to program impulse voltage sensitivity value.
ENTER key	When depressed, transfers numeric keyboard value into the 6002A memory.
DATA pushbutton	When depressed, produces data summary printout.
PRESET pushbutton	With FUNCTION switch set to program and a channel switch (1-5) depressed, depressing PRESET switch recalls non-volatile factory program for that channel.

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. EDISON, NEW JERSEY.
ALL RIGHTS RESERVED.

Figure 2-1. Series 626 Controls Used by the 6001A Plug-In

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. EDISON, NEW JERSEY.
ALL RIGHTS RESERVED.

2.3.2 Programming Procedure

Assume it is desired to program a full scale range of 20V, a high limit of 15V, a low limit of 10V, voltage sensitivity of 0.5 volts, and an impulse sensitivity of 2V. Voltage sensitivity sets the deviation from the present voltage value above or below which a detected value produces a recorded disturbance. For impulse measurements, the sensitivity corresponds to the absolute threshold, so that for an impulse sensitivity of 2 volts, a disturbance is recorded when impulse amplitude is greater than or equal to 2 volts.

For the example cited, program the 6002A as follows:

a. Set FUNCTION switch to PROGRAM.

b. Depress the channel pushbutton (1-5) that corresponds to the slot position of the plug-in to be programmed. Note that a program summary for that channel is immediately printed.

c. Note that the red indicator next to the RANGE pushbutton lights. Depress the RANGE key.

d. Note that two yellow indicators above the numeric keyboard now light. Enter 20, using the keyboard. This selects the first full scale range (0.5 to 20.0V) of the plug-in. As each digit is entered, one indicator goes out. If an error is made, depress CLEAR ENTRY and correct the entry.

e. When the full scale value has been programmed, the green indicator next to the ENTER key lights. Depress this key to enter the value. The full scale entry (RANGE F.S. 20.0V) will now be echoed back on the printout.

f. When the ENTER indicator goes out, one red indicator above the center bank of pushbuttons lights. This indicates that another function may be programmed.

g. Depress the HI LIMIT key. Program the high limit value (15) as in step d.

h. When the green ENTER indicator lights, depress the ENTER key. The programmed high limit value will be echoed back on the printout.

i. Repeat steps f, g, and h for the low limit value (10) using the LO LIMIT key.

j. Repeat steps f, g, and h for the voltage sensitivity, using the SENS key and programming the voltage value as 0.5.

k. Repeat steps f, g, and h for the impulse sensitivity (02 volts), using the IMP SENS key. The completed program printout should take the following form:

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. EDISON, NEW JERSEY.
ALL RIGHTS RESERVED.

626*

```
IMPULSE SENS  02.0V
VOLTAGE SENS  00.5V
 V LOW LIMIT  10.0V
V HIGH LIMIT  15.0V
RANGE F. S.   20.0V
```

626A*

```
RANGE F.S.    20.0V
V HIGH LIMIT  15.0V
 V LOW LIMIT  10.0V
VOLTAGE SENS  00.5V
IMPULSE SENS  02.0V
```

NOTE: The instrument is designed to detect an invalid entry and to automatically shift high and low limits if range is changed without reprogramming the limits. For example, if the full scale value is selected as 20V and the user selects 22V as the low limit value, the printout ENTRY TOO HIGH will appear.

1. When the plug-in program is completed, the user may proceed to program another module (by depressing another channel number) or to OPERATE. While on line, the program in effect may be obtained by simply depressing the PROG pushbutton.

2.4 SELECTING THE FACTORY PRESET PROGRAM

To select the program stored in hard memory, set the FUNCTION switch to PROGRAM and depress the channel number desired. The last operator-set program will be printed out. Now depress the PRESET pushbutton to recall the factory-set program. An example of this sequence appears below.

626

```
                IMPULSE SENS  02.0V
                VOLTAGE SENS  00.3V
(Factory         V LOW LIMIT  11.0
 Program)       V HIGH LIMIT  14.0V
                RANGE F.S.    20.0V
                  626-PA-6002A
                     CH 1
                PROGRAM SUMMARY

(Press
 Reset)

                IMPULSE SENS  02.0V
                VOLTAGE SENS  00.5V
(Operator       V LOW LIMIT   10.0V
 Program)       V HIGH LIMIT  15.0V
                RANGE F.S.    20.0V
                  626-PA-6002A
                     CH1
                PROGRAM SUMMARY
                 PROGRAM MODE
```

626A

```
                 PROGRAM MODE
                PROGRAM SUMMARY
                     CH1
                  626-PA-6002A
               RANGE F.S.    20.0V
                V HIGH LIMIT  15.0V
                 V LOW LIMIT  10.0V

                VOLTAGE SENS  00.5V
                IMPULSE SENS  02.0V

                                (Press
                                 Reset)

                PROGRAM SUMMARY
                     CH 1
                  626-PA-6002A
               RANGE F.S.    20.0V
                V HIGH LIMIT  14.0V
                 V LOW LIMIT  11.0V
                VOLTAGE SENS  00.3V
                IMPULSE SENS  02.0V
```

(Operator Program)

(Factory Program)

---

*If you are using a Model 626, read (from the bottom up) the "626" printouts in this manual; if using a 626A, read (from the top down) the "626A" printouts instead.

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. EDISON, NEW JERSEY.
ALL RIGHTS RESERVED.

2.5 DESCRIPTION OF DATA PRINTOUTS

When any of the disturbances described below is detected by the 6002A, it is recorded and displayed in characteristic manner.

2.5.1 Overvoltage

An overvoltage condition exists when the monitored DC bus voltage exceeds the user specified upper limit for more than 2.55 seconds. The beginning of an overvoltage condition is indicated by a printout such as the following:

```
4    HIGH    12:34:56.78
```

where 4 is the channel number and time is given in hours, minutes and seconds (to .01 sec resolution).

When the DC voltage recovers to normal, a printout such as the following occurs:

```
                626                          626A

↑   4  NORM  12:36:14.56          16.5  V  MAX          ↓
       16.5  V  MAX              4 NORM  12:36:14.56
```

indicating when normal voltage was restored and the value of the highest voltage reached during the overvoltage interval.

2.5.2 Undervoltage

An undervoltage condition exists when the monitored power line voltage remains below the user-specified lower limit for more than 2.55 seconds. The beginning of an undervoltage condition is indicated by a printout such as the following:

```
4    LOW    10:09:12.34
```

When the line voltage returns to normal level, a message such as the following is printed:

```
                626                          626A

↑   4  NORM  10:09:23.45          10.4  V  MIN          ↓
       10.4  V  MIN              4 NORM  10:09:23.45
```

indicating when normal voltage was restored and the value of the lowest voltage reached during the undervoltage interval.

2.5.3 Voltage Change

A voltage change printout is triggered when the line voltage changes more than a preselected amount from the last printed value. The voltage change sensitivity is a user-selected voltage that varies with the full scale range selected. For the 20V range, a sensitivity of 0.1 to 5.0V may be selected. The following example shows several voltage change printouts:

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. EDISON, NEW JERSEY.
ALL RIGHTS RESERVED.

626	626A	Remarks
2 INC #1:02:34.56 12.4V	12.4V 2 INC #1:02:34.56	Voltage increased to 12.4 V at time shown
2 DEC #1:02:34.56 11.3V	11.3V 2 DEC #1:02:34.56	Voltage decreased to 11.3 V at time shown

2.5.4 Voltage Surge

A Voltage Surge is defined as a DC voltage which increases through a user-selected upper limit and then returns to an in-tolerance condition in less than 2.56 seconds. When a surge begins, its starting time is printed as follows:

```
3    HIGH    12:34:50.49
```

When the DC voltage returns to a normal level following a Surge condition, a message such as the following will be printed:

626	626A
3 NORM 12:34:51.59 15.1 V MAX SURGE 1.10 SEC	SURGE 1.10 SEC 15.1 V MAX 3 NORM 12:34:51.59

In this case, the time at which the voltage returned to normal is shown as well as the maximum voltage reached and the surge duration.

2.5.5 Voltage Sag

A Voltage Sag is defined as a line voltage that decreases below the user-selected lower limit and then returns to an in-tolerance condition in less than 2.56 seconds. Sag printouts take the same form as surge printouts, with the term SAG replacing the term SURGE, and the term MIN replacing the term MAX.

2.5.6 Impulses

"Impulse" disturbances represent any line perturbation which contains frequency components in the 300 Hz to 500 kHz range. An impulse type disturbance produces a printout such as the following:

626	626A
2 IMP 10:12:13.45 +020 V PK	+020 V PK 2 IMP 10:12:13.45

This printout indicates that an impulse which deviated from normal DC voltage by +20 volts peak was detected on Channel 2 at the time shown.

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. EDISON, NEW JERSEY.
ALL RIGHTS RESERVED.

2.6 PRINTOUT MODES

The setting of the PRINTOUT MODE switch on the front panel of the mainframe determines how much detail is printed out. Printout data is reduced as the switch is rotated counterclockwise.

The following example printouts show how various settings of the PRINTOUT MODE switch change the amount of detail in the printed record of a disturbance. It is assumed that the disturbances occurred in Channel 1 and that the limits for Channel 1 were programmed as follows:

RANGE F.S.	80V	V HIGH LIMIT	70V
V LOW LIMIT	50V	V SENSITIVITY	2V

The example printouts are referenced to figures 2-2 and 2-3 which illustrate overvoltage and voltage sag disturbances, respectively.

Disturbances which occur with the PRINTOUT MODE switch in the SUMMARY ONLY position do not generate individual printouts but are stored in the daily accumulator and are automatically printed each day at midnight (worst case event and number of occurrences in each category). This printout may also be triggered manually by depressing the DATA button.

The printout generated first (on the next page) is an example of overvoltage (fig. 2-2) in the NORMAL mode. The second group shows overvoltage in the OUT-OF-LIMITS ONLY mode.

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. EDISON, NEW JERSEY.
ALL RIGHTS RESERVED.

626

```
1 NORM 12:56:38.51
  84.1  V  MAX
1 HIGH 12:56:34.21

1 NORM 12:56:38.51
  84.1  V  MAX
1  DEC  12:56.38.50
   75.2 V
1  INC  12:56:35.78
   82.3 V
1  INC  12:56:35.62
   80.3 V
1  INC  12:56:35.40
   78.3 V
1  INC  12:56:34.22
   76.3 V
1  INC  12:56:34.21
   74.2 V
1  HIGH  12:56:34.21
```

626A

```
1  HIGH  12:56:34.21
   74.2 V
1  INC  12:56:34.21
   76.3 V
1  INC  12:56:34.22
   78.3 V
1  INC  12:56:35.40
   80.3 V
1  INC  12:56:35.62
   82.3 V
1  INC 12:56:35.78
   75.2V
1  DEC  12:56:38.50
   84.1 V  MAX
1  NORM 12:56:38.51

1  HIGH 12:56:34.21
   84.1 V MAX
1  NORM 12:56:38.51
```

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. EDISON, NEW JERSEY.
ALL RIGHTS RESERVED.

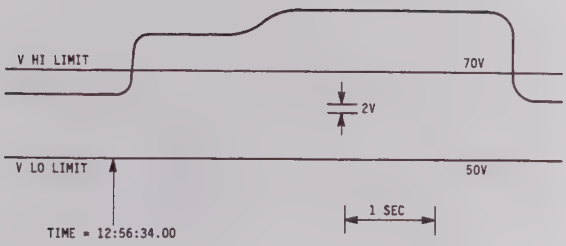


Figure 2-2. Overvoltage Disturbance (6002A)

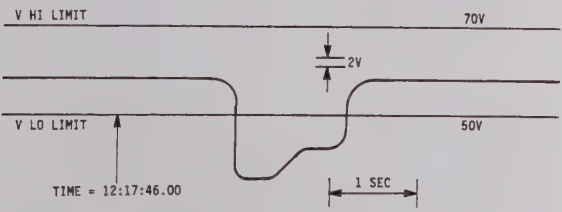


Figure 2-3. Voltage Sag Disturbance (6002A)

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. EDISON, NEW JERSEY.
ALL RIGHTS RESERVED.

The following printout illustrates overvoltage (fig. 2-2 in the MAXIMUM DETAIL mode.

626

```
1  DEC  12:56:38.61
   64.8 V

1  DEC  12:56:38.53
   66.8  V

1  DEC  12:56:38.51
   69.0  V

1  NORM 12:56:38.51
   84.1  V  MAX

1  DEC  12:56:38.50
   75.2 V

1  INC  12:56:35.78
   82.3 V

1  INC  12:56:35.62
   80.3 V

1  INC  12:56:35.40
   78.3 V

1  INC  12:56:34.22
   76.3 V

1  INC  12:56:34.21
   74.2 V

1  HIGH  12:56:34.21

1  INC  12:56:34.20
   66.1 V

1  INC  12:50:12.34
   64.0 V
```

626A

```
   64.0 V
1  INC  12:50:12.34

   66.1 V
1  INC  12:56:34.20

1  HIGH  12:56:34.21

   74.2 V
1  INC  12:56:34.21

   76.3 V
1  INC  12:56:34.22

   78.3 V
1  INC  12:56:35.40

   80.3 V
1  INC  12:56:35.62

   82.3 V
1  INC  12:56:35.78

   75.2 V
1  DEC  12:56:38.50

   84.1  V  MAX
1  NORM 12:56:38.51

   69.0  V
1  DEC  12:56:38.51

   66.8  V
1  DEC  12:56:38.53

   64.8 V
1  DEC  12:56:38.61
```

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. EDISON, NEW JERSEY.
ALL RIGHTS RESERVED.

The first group generated in the printouts below illustrates voltage sag (fig. 2-3) in the NORMAL mode; the second (3-line) group illustrates voltage sag in the OUT-OF-LIMITS mode.

626

```
1  NORM  12:17:48.61
   035.1  V  MIN
   SAG 1.25  SEC

1  LOW   12:17:48.51

1  NORM  12:17:48.61
   035.1  V  MIN
   SAG  1.25 SEC
1  INC  12:17:48.60
   48.1  V

1  INC  12:17:48.55
   043.0  V
1  INC  12:17:48.05
   041.0  V
1  INC  12:17:47.96
   039.0 V
1  DEC  12:17:47.39
   036.9 V
1  DEC 12:17:47.37
   039.1 V
1  DEC  12:17:47.36
   46.3 V
1  LOW  12:17:47.36
```

626A

```
1  LOW  12:17:47.36

   046.3  V
1  DEC   12:17:47.36

   039.1  V
1  DEC  12:17:47.37

   036.9  V
1  DEC  12:17:47.39

   039.0  V
1  INC  12:17:47.96

   041.0  V
1  INC  12:17:48.05

   043.0  V
1  INC  12:17:48.55

   48.1   V
1  INC  12:17:48.60

   SAG   1.25 SEC
   035.1  V  MIN
1  NORM  12:17:48.61

1  LOW   12:17:48.51

   SAG  1.25  SEC
   035.1  V  MIN
1  NORM   12:17:48.61
```


COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. EDISON, NEW JERSEY.
ALL RIGHTS RESERVED.

The following is an example of printout of voltage sag (fig. 2-3) in the MAXIMUM DATAIL mode.

626

```
.  INC  12:17:48.86
   57.1  V

.  INC  12:17:48.69
   55.1  V

.  INC  12:17:48.62
   53.1  V

.  INC  12:17:48.61
   50.9  V

.  NORM 12:17:48.61
   035.1 V MIN
   SAG 1.25 SEC

.  INC  12:17:48.60
   48.1  V

.  INC  12:17:48.55
   043.0  V

.  INC  12:17:48.05
   041.0  V

.  INC  12:17:47.96
   039.0  V

.  DEC  12:17:47.39
   036.9  V

.  DEC  12:17:47.37
   039.1  V

.  DEC  12:17:47.36
   46.3  V

.  LOW  12:17:47.36

.  DEC  12:17:47.35
   55.8  V

.  INC  12:16:32.15
   58.0  V
```

626A

```
   58.0  V
.  INC  12:16:32.15

   55.8  V
.  DEC  12:17:47.35

.  LOW  12:17:47.36

   46.3  V
.  DEC  12:17:47.36

   039.1  V
.  DEC  12:17:47.37

   036.9  V
.  DEC  12:17:47.39

   039.0  V
.  INC  12:17:47.96

   041.0  V
.  INC  12:17:48.05

   043.0  V
.  INC  12:17:48.55

   48.1  V
.  INC  12:17:48.58

   SAG 1.25 SEC
   035.1 V MIN
.  NORM 12:17:48.61

   50.9  V
.  INC  12:17:48.61

   53.1  V
.  INC  12:17:48.62

   55.1  V
.  INC  12:17:48.69

   57.1  V
.  INC  12:17:48.86
```

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. EDISON, NEW JERSEY.
ALL RIGHTS RESERVED.

SECTION III
OPERATIONAL TEST

3.1 GENERAL

This section provides information for performing an operational test to verify that the 6A32A plug-in is operating properly.

3.2 SYSTEM CHECK

When the PRINTOUT MODE switch is set to SYSTEM CHECK, a source of precise signals is applied to the front end circuitry of the 6A32A. Any inputs that are connected at this time will be automatically disconnected for the system check period. These signals fully verify the operational integrity of the module. A typical system check printout, as well as the system check signals and the allowable tolerance levels are shown below.

626	626A
**********	***SYSTEM CHECK***
PRESENT V 05.06 V	00/00/00 01:21:10
IMP + 10.20 V PK	
626-PA-6002AR2	CH 1
CH 1	626-PA-6002AR2
	IMP + 10.20 V PK
00/00/00 01:21:10	PRESENT V 05.06 V
SYSTEM CHECK	**********

3.3 SYSTEM CHECK SIGNALS

Impulse: +10.00V pk

Voltage: 5.00V DC

3.4 SYSTEM CHECK TOLERANCES

F.S. Range	Impulse	Voltage
20V	8.8 to 11.2 Vpk	4.85 to 5.15 V
40V	8.6 to 11.4 Vpk	4.75 to 5.25 V
80V	8.2 to 11.8 Vpk	4.55 to 5.45 V

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. EDISON, NEW JERSEY.
ALL RIGHTS RESERVED.

APPENDIX A. IMPULSE DURATION OPTION 10, FOR 626-PA-6002A PLUG-IN (NOT COMPATIBLE WITH OPTION 102)

A.1 INTRODUCTION

The following paragraphs describe the differences between the 6002A with Option 101 and the standard 6002A.

NOTE

The following data supersedes that found in previous paragraphs of this manual unless otherwise stated.

A.2 PURPOSE

Option 10, is designed to provide information on impulse duration. It has no effect on the measurements made by the standard 6002A as described in previous paragraphs.

A.3 EQUIPMENT CHARACTERISTICS

Technical specifications for Option 10, are listed in Table A-1. All specifications for the 6002A, listed in Table 1-1, still apply.

Table A-1. 626-PA-6002A Option 10, Technical Specifications

IMPULSE DURATION

Range: 1 uSec to 1023 uSec

Accuracy: ±6% of reading ±0.1% F.S. for 1/2 sinewave pulses up to 100 uSec duration greater than 2.00 Vpk. * Typically - 10% at 200 uSec, -20% at 400 uSec, -50% at 1000 uSec.

* 2.00 Vpk on 20 V F.S. Range
4.00 Vpk on 40 V F.S. Range
8.00 Vpk on 80 V F.S. Range

Timing Reference Points: Start at 0.5V** - stop at 30% of Vpk.

** 0.5 Vpk on 20 V dc Range
1.0 Vpk on 40 V dc Range
2.0 Vpk on 80 V dc Range

Minimum Impulse Voltages: 1.00 Vpk on 20.0 V dc Range
2.00 Vpk on 40.0 V dc Range
4.00 Vpk on 80.0 V dc Range

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

A.4 INSTALLATION IN MAINFRAME

The module is installed in the mainframe in the same manner as the standard 6002A (par. 2.1).

A.5 CONNECTIONS TO THE MODULE

Connecting the 6002A to the line to be monitored is the same as described in paragraph 2.2.

A.6 OPERATING THE 6002A WITH OPTION 101

Operation of the 6002A with Option 101 requires no additional programming steps. It is the same as described in paragraph 2.3.2.

A.7 DESCRIPTION OF DATA PRINTOUTS

The only printouts affected by the addition of Option 101 are those for module identification and impulse data.

PROGRAM SUMMARY

When the Program Summary key (designated "PROG") is depressed, the module will be identified as a 626-PA-6002AR1 as in the following example.

626	626A
IMPULSE SENS 02.0V	PROGRAM SUMMARY
VOLTAGE SENS 00.5V	11/17/83 14:10:53
V LOW LIMIT 10.0V	CH1
V HIGH LIMIT 15.0V	626-PA-6002AR1
RANGE F.S. 20.0V	RANGE F.S. 20.0V
626-PA-6002AR1	V HIGH LIMIT 15.0V
CH1	V LOW LIMIT 10.0V
11/17/83 14:10:53	VOLTAGE SENS 00.5V
PROGRAM SUMMARY	IMPULSE SENS 02.0V

IMPULSE

When used with the 20.0V FS range, a minimum impulse voltage of 1.00 Vpk is required to obtain duration data. This minimum voltage level increases with range, as shown in Table A-1. The impulse printout will take the following form:

626	626A
4 IMP 12:34:56.88	+ 03.64V PK, 089 uS
+ 03.64V PK, 089uS	4 IMP 12:34:56.88

This printout indicates that an impulse which deviated from the normal bus voltage for 89 microseconds with a peak voltage of 3.64 volts was detected on channel 4 at the time shown. The "+" preceding the impulse voltage indicates that the impulse was positive with respect to the "-" terminal on the 6002A rear panel.

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

Figure A-1 illustrates an impulse duration measurement.

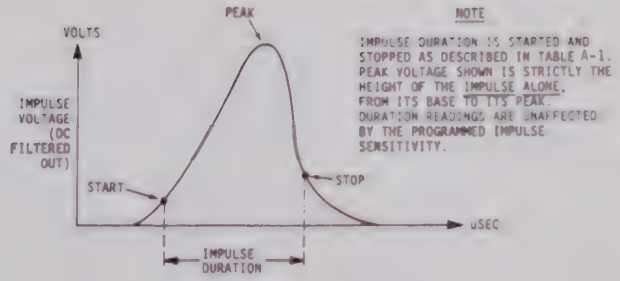

PEAK
VOLTS
IMPULSE VOLTAGE (DC FILTERED OUT)
START
STOP
uSEC
IMPULSE DURATION
NOTE
IMPULSE DURATION IS STARTED AND STOPPED AS DESCRIBED IN TABLE A-1. PEAK VOLTAGE SHOWN IS STRICTLY THE HEIGHT OF THE IMPULSE ALONE, FROM ITS BASE TO ITS PEAK. DURATION READINGS ARE UNAFFECTED BY THE PROGRAMMED IMPULSE SENSITIVITY.

Figure A-1. Impulse Duration Measurement

A.8 Printout Modes

Printout modes and calibration signals remain the same as in the standard 6002A described in paragraph 2.6.

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

APPENDIX B. IMPULSE STRENGTH OPTION, OPTION .02 FOR 626-PA-6002A PLUG-IN (NOT COMPATIBLE WITH OPTION .01)

B.1 INTRODUCTION

The following paragraphs describe the differences between the 6002A with Option 102 and the standard 6002A.

NOTE

The following data supersedes that found in Sections I thru III unless otherwise stated.

B.2 PURPOSE

Option 102 is designed to provide information on impulse strength (volt-second) area; it has no effect on the measurements made by the standard 6002A.

B.3 EQUIPMENT CHARACTERISTICS

Technical specifications for Option 102 are listed in Table B-1. All specifications for the 6002A, listed in Table 1-1, still apply.

Table B-1. 626-PA-6002A Option 102 Technical Specifications

IMPULSE STRENGTH

Ranges: 20.0V F.S. Range 0.000004 to 0.004092 V-Sec
40.0V F.S. Range 0.000008 to 0.008184 V-Sec
80.0V F.S. Range 0.000016 to 0.016368 V-Sec

Accuracy: ±10% of reading, ±0.1% of F.S. for 1/2 sinewave pulses up to 100 uSec duration greater than 2.00 Vpk*.
Typically -20% at 200 uSec, -50% at 500 uSec.

* 2.00 Vpk on 20.0V F.S. Range
4.00 Vpk on 40.0V F.S. Range
8.00 Vpk on 80.0V F.S. Range

Timing Reference Points: Start at 0.5V** - stop at 30% of Vpk.

** 0.5 Vpk on 20 V dc Range
1.0 Vpk on 40 V dc Range
2.0 Vpk on 80 V dc Range

Minimum Impulse Voltages: 1.00 Vpk on 20.0 Vdc Range
2.00 Vpk on 40.0 Vdc Range
4.00 Vpk on 80.0 Vdc Range

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

B.4 INSTALLATION IN MAINFRAME

The module is installed in the mainframe in the same manner as the standard 6002A (par. 2.1).

B.5 CONNECTIONS TO THE MODULE

Connecting the 6002A with Option 102 to the line to be monitored is the same as the standard 6002A (par. 2.2.1).

B.6 OPERATING THE 6002A WITH OPTION 102

Operation of the 6002A with Option 102 requires no additional progamming steps. Programming is the same as described in paragraph 2.3.2.

B.7 DESCRIPTION OF DATA PRINTOUTS

The only printouts affected by the addition of Option 102 are those for module identification and impulse data.

PROGRAM SUMMARY

When the Program Summary key (designated "PROG") is depressed, the module will be identified as a 526-PA-6002AR2 as in the following example.

626

```
IMPULSE SENS      01.0V
VOLTAGE SENS      00.5V
V LOW LIMIT       10.0V
V HIGH LIMIT      15.0V
RANGE F.S.        20.0V
  626-PA-6002AR2
      CH1
11/17/83   14:27:39
PROGRAM SUMMARY
```

626A

```
PROGRAM SUMMARY
11/17/83   14:27:39
      CH1
  626-PA-6002AR2
RANGE F.S.        20.0V
V HIGH LIMIT      15.0V
V HIGH LIMIT      10.0V
VOLTAGE SENS      00.5V
IMPULSE SENS      01.0V
```

IMPULSE

When used with the 20.0V FS range, a minimum impulse voltage of 1.00 Vpk is required to obtain strength data. This minimum voltage level increases with range as shown in Table B-1.

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

The impulse printout will have the following form:

626	626A
4 IMP 12:34:56.88	+02.58V PK
0.000156 V-SEC	0.000156 V-SEC *
+02.58V PK	4 IMP 12:34:56.88

This printout indicates that an impulse which deviated from the normal bus voltage with a strength of 0.000156 V-Sec and a peak voltage of 2.58 volts was detected on channel 4 at the time shown. The "+" preceding the impulse voltage indicates that the impulse was positive with respect to the "-" terminal on the 6002A rear panel.

Figure B-1 illustrates an impulse strength measurement.

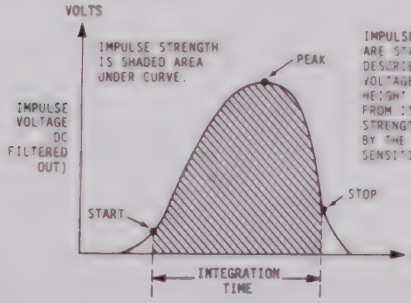

VOLTS
IMPULSE STRENGTH IS SHADED AREA UNDER CURVE.
PEAK
IMPULSE VOLTAGE DC FILTERED OUT)
START
STOP
SECONDS
INTEGRATION TIME
NOTE
IMPULSE STRENGTH MEASUREMENTS ARE STARTED AND STOPPED AS DESCRIBED IN TABLE B-1. PEAK VOLTAGE SHOWN IS STRICTLY THE HEIGHT OF THE IMPULSE ALONE, FROM ITS BASE TO ITS PEAK. STRENGTH READINGS ARE UNAFFECTED BY THE PROGRAMMED IMPULSE SENSITIVITY.

Figure B-1. Impulse Strength Measurement

B.8 PRINTOUT MODES

Printout modes and calibration signals remain the same as in the standard 6002A described in paragraph 2.6.

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

WARNING

Because of possible shock or fire hazards, connection of this instrument should be performed in compliance with the National Electrical Code (ANSI C1) and/or any other requirements which may be applicable to the user.

Installation, operation and maintenance should be performed only by qualified personnel.

TM-110385-3U

VOLUME 1

OPERATOR'S MANUAL

626-PA-6002C

DC MONITOR

NOTE: Refer to Volume 2 (Service Manual) of TM-110385-3U for maintenance data

1 May 1984
(Rev. 1 September 1985)
(Rev. 1 May 1986)

© COPYRIGHT 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. EDISON, NEW JERSEY.
ALL RIGHTS RESERVED.

DRANETZ

DRANETZ TECHNOLOGIES, INC.
1000 New Durham Rd., PO Box 4019
Edison, New Jersey 08818-4019

NOTICE CONCERNING DRANETZ' PROPRIETARY RIGHTS

This publication contains information proprietary to Dranetz Technologies, Inc. By accepting and using this manual, the user agrees that the information contained herein will be used solely for the purpose of repairing or operating equipment of Dranetz Technologies, Inc. These manuals are to be returned to Dranetz Technologies, Inc. when no longer required by the user, or when there is a change in ownership of the equipment.

These publications are protected under the Copyright laws of the United States Title 17 et seq. No part of this publication may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language or computer language, in any form, by any means, electronic, mechanical, magnetic, optical, chemical, manual, or otherwise, without the expressed written consent of Dranetz Technologies, Incorporated, 1000 New Durham Road, PO Box 4019, Edison, New Jersey 08818-4019.

TABLE OF CONTENTS

626-PA-6002C DC MONITOR

VOLUME 1

Section			Page
I	GENERAL INFORMATION		
	1.1	Scope	1-1
	1.2	Introduction	1-1
	1.3	Purpose	1-1
	1.4	Equipment Characteristics	1-2
	1.5	Standard Accessories	1-3
	1.6	Optional Accessories	1-3
	1.7	Factory Repair	1-4
II	INSTALLATION AND OPERATION		
	2.1	Installation	2-1
	2.1.1	Load Ratings	2-1
	2.2	Connecting DC Power Source to Module	2-2
	2.2.1	Connection Procedure	2-2
	2.2.2	Circuit Applications	2-2
	2.2.3	Installation Guidelines	2-4
	2.3	Operating the 6002C	2-5
	2.3.1	Operating Controls and Indicators	2-5
	2.3.2	Programming Procedure	2-7
	2.4	Selecting the Factory Preset Program	2-8
	2.5	Description of Data Printouts	2-9
	2.5.1	Overvoltage	2-9
	2.5.2	Undervoltage	2-9
	2.5.3	Voltage Change	2-9
	2.5.4	Voltage Surge	2-10
	2.5.5	Voltage Sag	2-10
	2.5.6	Impulses	2-10
	2.6	Printout Modes	2-11
III.	OPERATIONAL TEST		
	3.1	General	3-1
	3.2	System Check	3-1
	3.3	System Check Signals	3-1
	3.4	System Check Tolerances	3-1
APPENDIX A.		Impulse Duration Option, Option 101	A-1
APPENDIX B.		Impulse Strength Option, Option 102	B-1

COPYRIGHT © 1981,1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

LIST OF ILLUSTRATIONS

Figure		Page
2-1	Series 626 Controls Used by the 6002C Plug-In	2-6
2-2	Overvoltage Disturbance (6002C)	2-12
2-3	Voltage Sag Disturbance (6002C)	2-12
A-1	Impulse Duration Measurement	A-3
B-1	Impulse Strength Measurement	B-3

LIST OF TABLES

Table		Page
1-1	626-PA-6002C Technical Specifications	1-2
2-1	6002C Operating Controls	2-5
A-1	626-PA-6002C Option 101 Technical Specifications	A-1
B-1	626-PA-6002C Option 102 Technical Specifications	B-1

COPYRIGHT © 1981,1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

STATEMENT OF WARRANTY

ALL PRODUCTS OF DRANETZ TECHNOLOGIES, INC. ARE WARRANTED TO THE ORIGINAL PURCHASER AGAINST DEFECTIVE MATERIAL AND WORKMANSHIP FOR A PERIOD OF ONE YEAR FROM THE DATE OF DELIVERY. DRANETZ WILL REPAIR OR REPLACE, AT ITS OPTION, ALL DEFECTIVE EQUIPMENT RETURNED, FREIGHT PREPAID, DURING THE WARRANTY PERIOD, WITHOUT CHARGE FOR REPAIR, PROVIDED THERE IS NO EVIDENCE THAT THE EQUIPMENT HAS BEEN MIS-HANDLED OR ABUSED.

NOTE

The information in this manual has been reviewed and is believed to be entirely reliable. However, no responsibility is assumed for any inaccuracies. The material in this manual is for information purposes only, and is subject to change without notice.

VOLUME 1
OPERATOR'S MANUAL

626-PA-6002C DC MONITOR

SECTION I
GENERAL INFORMATION

1.1 SCOPE

This manual consists of two volumes. Volume 1, the Operator's manual, consists of three sections: I) GENERAL INFORMATION, II) INSTALLATION AND OPERATION, AND III) OPERATIONAL TEST. In addition, Appendixes A and B cover Options 001 and 002, respectively, for the 6002C plug-in. Volume 2, the Service manual, contains the maintenance instructions (Sections IV thru VII).

1.2 INTRODUCTION

This technical manual provides operating instructions for the 626-PA-6002C DC Monitor Plug-in, hereinafter referred to as the 6002C plug-in. The 6002C plug-in is designed for installation in the Series 626 Universal Disturbance Analyzer. It is assumed that the reader is familiar with the mainframe information described in Volume 1 of the Series 626 Mainframe manual.

1.3 PURPOSE

The 6002C monitors disturbances on DC power buses. This single channel unit has an overall range of 25 to 600 VDC, programmable in three ranges. With thresholds programmed by the user, the 6002C stores, analyzes, classifies and prints out quantitative and qualitative disturbance data. Accompanying the data is a printout of time derived from a highly accurate crystal-controlled 24-hour clock in the mainframe.

The 6002C monitors two types of disturbances: DC power bus transients and waveform disturbances. Power bus transients are divided into five display categories: overvoltage, undervoltage, voltage change, voltage surge and voltage sag. Waveform disturbances, identified as "impulses", include all conditions that cause the power bus waveform to deviate from an ideal (flat) waveform. The threshold value of each type of disturbance, above which detection and printout occurs, is operator programmable. Except for an automatic summary printout at the end of each day, disturbance data is normally printed out only when disturbances occur. In an alternate mode, a disturbance data summary printout occurs only at the end of each day. This feature permits long term unattended operation.

COPYRIGHT © 1981,1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

The threshold program may be easily altered, using the front panel switches. Cueing indicators adjacent to the programming switches simplify the programming procedure. A back-up program for the plug-in, stored in hard memory at the factory, may always be recalled upon operator demand. Both the program and the disturbance data in the data accumulators may be printed out upon demand.

1.4 EQUIPMENT CHARACTERISTICS

The 6002C is configured as a plug-in module 6.5" high by 1.25" wide by 10" deep. It is designed for installation in any of the five slots of the Series 626 Universal Disturbance Analyzer. Technical specifications of the 6002C are listed in Table 1-1.

Table 1-1. 626-PA-6002C Technical Specifications

Input	2-wire differential Z_{in} = 40 meg plus 40 pf (each side to ground)
Overall Voltage Ranges	25 to 150V 50 to 300V 100V to 600V
User set voltage lower spec limit (1V increments)	
150V Range	25V to 149V
300V Range	50V to 298V
600V Range	100V to 596V
User set voltage upper spec limit	
150V Range	26V to 150V
300V Range	52V to 300V
600V Range	104V to 600V
Voltage Change Sensitivity (1V Increments)	
150V Range	1 to 15 volts
300V Range	2 to 30 volts
600V Range	4 to 60 volts
Voltage Measurement Accuracy	±1% of reading, ±0.5% of F.S.
Voltage Measurement Resolution	
150V Range	0.2V
300V Range	0.4V
600V Range	0.8V

COPYRIGHT © 1981,1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

Table .. 626-PA-6002C Specifications Cont'd.

Impulse Ranges (2 mSec to 1 uSec)	
150V Range	25 to 1000V
300V Range	50 to 2000V
600V Range	100 to 4000V
Impulse Thresholds (1 volt increments)	
150V Range	25 to 500V
300V Range	50 to 1000V
60V Range	100 to 2000V
Impulse Accuracy	+5% of reading ±1% F.S. for half sinewave impulses 10 uSec in duration regardless of polarity or grounding. Error increases to +10% of reading, ±1% F.S. at 5 uSec and 50 uSec pulse durations, and is typically -6dB at 2 mSec and 1 uSec pulse durations.

1.5 STANDARD ACCESSORIES

Model No.	Part No.	Quantity	Description
626-PA-6002C	TM-110385-3U (Vol. 1)	1	Operator's Manual

1.6 OPTIONAL ACCESSORIES

Part No.	Quantity	Description
TM-110385-3U (Vol. 2)	1	Service (Maintenance) Manual

COPYRIGHT © 1981,1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

1.7 FACTORY REPAIR

When factory repair is desired, proceed as follows:

1. Contact the Dranetz Service Corporation (formerly Dranetz Technologies, Inc., Customer Service Department) in order to obtain an Authorization Number for factory repair.

Telephone: (201) 755-7081

TWX: (710) 997-9553

Telex: 499-7808

Cable: DRANETZ

2. Fill out the REPAIR/SERVICE ORDER enclosed in the Series 626 Operating manual. Ship it along with the malfunctioning equipment to the Dranetz Service Corporation.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

SECTION 2
INSTALLATION AND OPERATION

2.1 INSTALLATION

To install the 626PC in the mainframe, proceed as follows:

CAUTION: Be sure 626 is turned off and that all power connected to all the plug-in modules is turned off.

a. Position the top and bottom front corners of the plug-in module in the upper and lower tracks at the desired slot position at the rear of the mainframe.

b. Carefully slide the module into the mainframe until it is firmly seated.

c. Tighten the top and bottom captive screws to secure the module to the mainframe.

2.1.1 LOAD RATINGS

The Series 626 standard mainframe has an upper limit of the total load rating of the installed modules. The overall mainframe capacity is set at 20 units, and individual modules have load ratings as follows:

Plug-In	Load Rating
626-PA-6001	2 Units
626-PA-6001 With Extra Option Board	3 Units
626-PA-6002	2 Units
626-PA-6003	4 Units
626-PA-6005	2 Units
626-PA-6006	2 Units
626-PA-6007	1 Unit
626-PA-6008	2 Units
626-PA-6009	4 Units
626-PA-6011	1 Unit
626-PA-6012	2 Units
626-PA-6012A	3 Units
626-PA-6013	2 Units
626-PA-6014	1 Unit
626-PA-6015	4 Units
626-PA-6018	4 Units
626-PA-6020	4 Units

COPYRIGHT © 1981,1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

NOTE

When selecting modules for installation in any mainframe, verify that the sum of the load ratings of the installed modules DOES NOT exceed 20.

2.2 CONNECTING DC POWER SOURCE TO MODULE

2.2.1 Connection Procedure

The 6002C is supplied with a barrier type terminal strip under a small cover located at the rear of the module. Proceed as follows:

a. Insert key in FUNCTION key switch on front panel of mainframe and set switch to OFF position.

b. Turn off DC power source that is to be monitored by the module.

c. Remove the terminal strip safety cover to expose the connections. Now connect the DC line to the three power terminals (two DC leads to upper two terminals and earth ground to the third terminal, as marked). When all connections have been made, be sure to replace the terminal block cover, then reapply DC power.

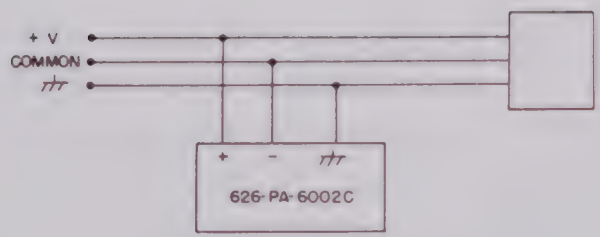
CAUTION: To avoid damaging the equipment, do not apply DC voltages in excess of 600V peak to the 6002C.

2.2.2 Circuit Applications

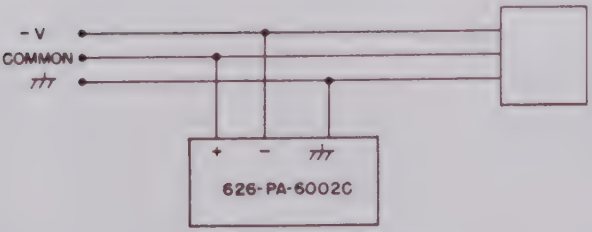
WARNING

Connection should only be performed by qualified personnel. Conductors connecting to measurement points should be approved for the specific use. When connected to branch circuits of 20 amperes or less, minimum flexible cord size is No. 18 (1 mm^2). For branch circuits with higher ampacity, refer to National Electric Code (ANSI CI-1975 Para. 240-4 and Para. 250-95). Special consideration of ground may be required. Refer to Article 250 of above reference if in doubt. Outside U.S.A. consult applicable safety standards.

COPYRIGHT © 1981,1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.



Connections to Positive DC Sources



Connection to Negative DC Sources

COPYRIGHT © 1981,1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

2.2.3 Installation Guidelines

Proper monitoring and analysis of AC and DC voltage disturbances requires careful attention to the method of connection between the Series 626 Universal Disturbance Analyzer and the monitored circuit. To obtain the most accurate and relevant voltage monitoring data, the following suggested guidelines should be utilized.

1. To minimize spurious Impulse transients and interchannel coupling, always use the Dranetz test cables supplied with the 626. If cables are not supplied, such as with the barrier strip input modules, the test cable should be composed of twisted-pair wires for each input channel.

2. Test cable length should be minimized, preferably less than 8 feet from the Series 626 to the circuit connection point. This will minimize amplitude variation of Impulse transients.

3. If monitoring a power line connected to critical, sensitive load equipment, the test cable should be connected to the power line as close as possible to the load. For three-phase loads, the 626 should be connected in the same way as the load equipment; i.e. Phase to Phase or Phase to Neutral.

4. Use of instrument-grade Potential Transformers for monitoring Impulses on high voltage power lines is not recommended. The limited frequency response of most Potential Transformers may result in substantial variation of Impulse amplitude.

5. The Series 626 is designed to operate from disturbed power lines. Therefore, the 626 power supply may be connected to the same power line that is being monitored. However, the user should be aware that the extensive transient suppression incorporated with the 626 power supply may alter the transient characteristics of the AC power line to which the power supply is connected. If the user wishes to prevent alteration of the transient characteristics of the power line being monitored, the 626 power supply input should be separated from the monitored inputs.

6. The ground terminals of the plug-in modules are connected internally to the safety grounding conductor in the 626 power plug. Be careful not to inadvertently contaminate a "clean" ground with a "dirty" ground.

COPYRIGHT © 1981,1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

2.3 OPERATING THE 6002C

2.3.1 Operating Controls and Indicators

The functions of the mainframe operating controls and indicators associated with 6002C operation are described in Table 2-1. Figure 2-1 shows the typical front panel controls on a Series 626. For a description of controls common to overall Series 626 operation, refer to Volume 1 of the Series 626 Mainframe manual.

Table 2-1. 6002C Operating Controls

Item	Function
RANGE pushbutton and lamp	When lamp lights, user is cued to to depress RANGE pushbutton and enter the desired full scale voltage range (150, 300, or 600) via the numeric keyboard.
LO LIMIT pushbutton	When depressed, enables numeric keyboard to program low limit voltage.
HI LIMIT pushbutton	When depressed, enables numeric keyboard to program high limit voltage.
SENS pushbutton	When depressed, enables numeric keyboard to program voltage sensitivity value.
IMP SENS pushbutton	When depressed, enables numeric keyboard to program impulse voltage sensitivity value.
ENTER pushbutton	When depressed, transfers numeric keyboard value into the 6002C memory.
DATA pushbutton	When depressed, produces data summary printout.
PRESET pushbutton	With FUNCTION switch set to PROGRAM and a channel switch (1-5) depressed, depressing PRESET switch recalls non-volatile factory program for that channel.

COPYRIGHT © 1981,1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

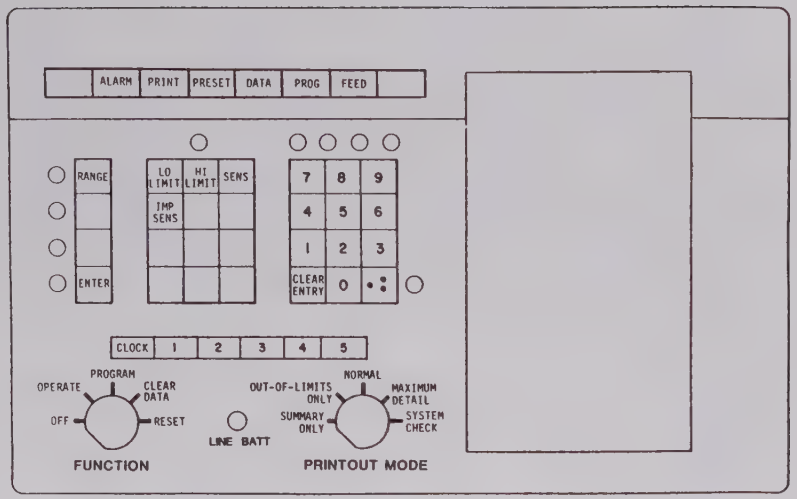


Figure 2-1. Series 626 Controls Used by the 6002C Plug-In

COPYRIGHT © 1981,1982,1983,1984,1985,1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

2.3.2 Programming Procedure

Assume it is desired to program a full scale range of 150V, a high limit of 135V, a low limit of 105V, voltage sensitivity at 2 volts and an impulse sensitivity of 100V. Voltage sensitivity sets the deviation from the present voltage value above or below which a detected value produces a recorded disturbance. For impulse measurements, the sensitivity corresponds to the absolute threhold, so that for an impulse sensitivity of 100 volts, a disturbance is recorded when impulse amplitude is greater than or equal to 100 volts.

For the example cited, program the 6002C as follows:

a. Set FUNCTION switch to PROGRAM.

b. Depress the channel pushbutton (1-5) that corresponds to the slot position of the plug-in to be programmed. Note that a program summary for that channel is immediately printed.

c. Note that the red lamp next to the RANGE pushbutton lights. Depress the RANGE pushbutton.

d. Note that three yellow lamps above the numeric keyboard now light. Enter 150, using the keyboard. This selects the first full scale range (25 to 150V). As each digit is entered, one lamp goes out. If an error is made, depress CLEAR ENTRY and correct the entry.

e. When the full scale value has been programmed, the green lamp next to the ENTER pushbutton lights. Depress this pushbutton to enter the value. The full scale entry (RANGE F.S. 150V) will now be echoed back on the printout.

f. When the green ENTER indicator goes out, one red indicator above the center bank of pushbuttons lights. This indicates that another function may be programmed.

g. Depress the HI LIMIT pushbutton. Program the high limit value (125) as in step d.

h. When the green ENTER indicator lights, depress the ENTER pushbutton. The programmed high limit value will be echoed back on the printout.

i. Repeat steps f, g and h for the low limit value (105), using the LO LIMIT pushbutton.

j. Repeat steps f, g and h for the voltage sensitivity, using the SENS pushbutton and programming the voltage value as 02.

k. Repeat steps f, g and h for the impulse sensitivity (0100 volts) using the IMP SENS pushbutton. The completed program printout should take the following form:

COPYRIGHT © 1981,1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

626*

```
    IMPULSE SENS    0100V
↑   VOLTAGE SENS    002 V
    V LOW LIMIT     105 V
    V HIGH LIMIT    125 V
    RANGE F.S.      150 V
```

626A*

```
RANGE F.S.      150 V
V HIGH LIMIT    125 V   ↓
V LOW LIMIT     105 V
VOLTAGE SENS    002 V
IMPULSE SENS    0100V
```

NOTE: This instrument is designed to detect an invalid entry and to automatically shift high and low limits if range is changed without reprogramming the limits. For example, if the full scale value is selected as 150V and the user selects 153V as the low limit value, the printout ENTRY TOO HIGH will appear.

1. When the plug-in program is completed, the user may proceed to program another module (by depressing another channel number) or he may place the instrument on line by setting the FUNCTION switch to OPERATE. While on line, the program in effect may be obtained by simply depressing the PROG pushbutton.

2.4 SELECTING THE FACTORY PRESET PROGRAM

To select the program stored in hard memory, set the FUNCTION switch to PROGRAM and depress the channel number desired. The last operator-set program will be printed out. Now depress the PRESET pushbutton to recall the factory-set program. An example of this sequence appears below.

626*

```
↑
(Factory
 Program)
|
|
(Press
 Reset)
|
|
(Operator
 Program)
|
```

```
IMPULSE SENS    0100 V
VOLTAGE SENS    002 V
V LOW LIMIT     105 V
V HIGH LIMIT    125 V
RANGE F.S.      150 V
    626-PA-6002C
        CH 1

IMPULSE SENS    0100 V
VOLTAGE SENS     005 V
V LOW LIMIT      125 V
V HIGH LIMIT     140 V
RANGE F.S.       150 V
    626-PA-6002C
        CH 1
PROGRAM SUMMARY

 PROGRAM MODE
```

626A*

```
PROGRAM MODE

PROGRAM SUMMARY
      CH 1
   626-PA-6002C
RANGE F.S.      150 V  (Operator
V HIGH LIMIT    140 V   Program)
V LOW LIMIT     125 V
VOLTAGE SENS    005 V
IMPULSE SENS    0100 V
|
|
|
```

2.5 DESCRIPTION OF DATA PRINTOUTS

When any of the disturbances described below is detected by the 626/626A, it is recorded and displayed in characteristic manner.

2.5.1 Overvoltage

An overvoltage condition exists when the monitored DC bus voltage exceeds the user-specified upper limit for more than 2.55 seconds. The beginning of an overvoltage condition is indicated by a printout such as the following:

```
4    HIGH    12:34:56.78
```

where 4 is the channel number and time is given in hours, minutes and seconds (to .01 sec resolution).

When the DC voltage recovers to normal, a printout such as the following occurs:

626				626A			
↑	4 NORM 12:36:14.56			145.2 V MAX			↓
	145.2 V MAX			4 NORM 12:36:14.56			

indicating when normal voltage was restored and the value of the highest voltage reached during the overvoltage interval.

2.5.2 Undervoltage

An undervoltage condition exists when the monitored power line voltage remains below the user-specified lower limit for more than 2.55 seconds. The start of this condition is indicated by a printout such as:

```
4    LOW    10:09:23:.34
```

When the voltage returns to normal level, a message such as the following is printed:

626				626A			
↑	4 NORM 10:09:23.45			96.4 V MIN			↓
	96.4 V MIN			4 NORM 10:09:23.45			

indicating when normal voltage was restored and the value of the lowest voltage reached during the undervoltage interval.

2.5.3 Voltage Change

A voltage change printout is triggered when the line voltage changes more than a preselected amount from the last printed value. The voltage change sensitivity is a user-selected voltage that varies with the full scale range selected. For the 150V range, a sensitivity of 1 to 15V may be selected. The following example shows several voltage change printouts.

COPYRIGHT © 1981,1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

626	626A	Remarks
2 INC Ø1:Ø2:34.56 138.6 V	138.6 V 2 INC Ø1:Ø2:34.56	Voltage increased to 138.6V at time shown
2 DEC Ø1:Ø2:34.56 135.1 V	135.1 V 2 DEC Ø1:Ø2:34.56	Voltage decreased to 135.1V at time shown

2.5.4 Voltage Surge

A Voltage Surge is defined as a DC voltage which increases through a user-selected upper limit and then returns to an in-tolerance condition in less than 2.56 seconds. When a surge begins, its starting time is printed as follows:

```
3    HIGH    12:34:50.49
```

When the DC voltage returns to a normal level following a Surge condition, a message such as the following will be printed.

626	626A
3 NORM 12:34:51.59 135.2 V MAX SURGE 1.1Ø SEC	SURGE 1.1Ø SEC 135.2 V MAX 3 NORM 12:34:51.59

In this case, the time at which the voltage returned to normal is shown as well as the maximum voltage reached and the surge duration.

2.5.5 Voltage Sag

A Voltage Sag is defined as a line voltage that decreases below the user-selected lower limit and then returns to an in-tolerance condition in less than 2.56 seconds. Sag printouts take the same form as surge printouts, with the term SAG replacing the term SURGE, and the term MIN replacing the term MAX.

2.5.6 Impulses

"Impulse" disturbances represent any line perturbation which contains frequency components in the 300 Hz to 500 kHz range. An impulse type disturbance produces a printout such as the following:

626	626A
2 IMP 10:12:13.45 +Ø139 V PK	+Ø139 V PK 2 IMP 10:12:13.45

This printout indicates that an impulse which deviated from normal DC voltage by +139 volts peak was detected on Channel 2 at the time shown.

COPYRIGHT © 1981,1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

2.6 PRINTOUT MODES

The setting of the PRINTOUT MODE switch on the front panel of the mainframe determines how much detail is printed out. Printout data is reduced as the switch is rotated counterclockwise.

The following example printouts show how various settings of the PRINTOUT MODE switch change the amount of detail in the printed report of a disturbance. It is assumed that the disturbances occurred in Channel 1 and that the limits for Channel 1 were programmed as follows:

RANGE F.S.	150 V
V LOW LIMIT	105 V
V HIGH LIMIT	125 V
V SENSITIVITY	2 V

The example printouts are referenced to figures 2-2 and 2-3 which illustrate overvoltage and voltage sag disturbances, respectively.

Disturbances which occur while the PRINTOUT MODE switch is in the SUMMARY ONLY position do not generate individual printouts but they are stored in the daily accumulator and are automatically printed each day at midnight (worst case event and number of occurrences in each category). This printout may also be triggered manually by depressing the DATA button.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

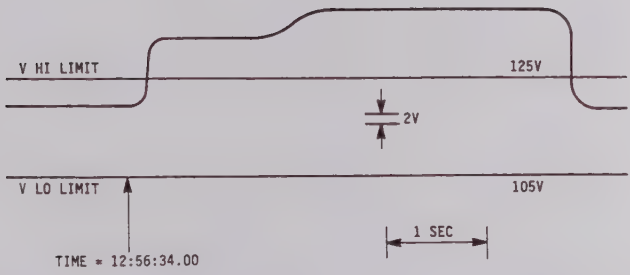


Figure 2-2. Overvoltage Disturbance (6002C)

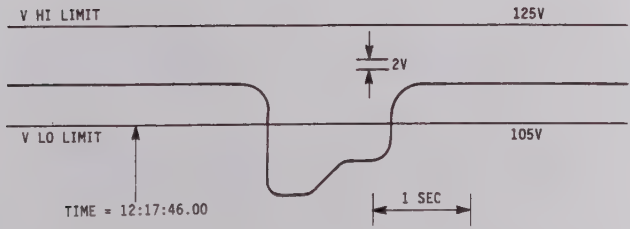


Figure 2-3. Voltage Sag Disturbance (6002C)

COPYRIGHT © 1981,1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

The printout generated first (below) illustrates overvoltage (fig. 2-1 in the NORMAL mode. The second (3-line) printout illustrates overvoltage in the OUT-OF-LIMITS ONLY mode.

626		626A	
1	NORM 12:56:38.51 139.1 V MAX	.	HIGH 12:56:34.21
			129.2 V
1	HIGH 11:56:34.21	.	INC 12:56:34.21
			131.3 V
		.	INC 12:56:34.22
			133.3 V
1	NORM 11:56:38.51 139.1 V MAX	.	INC 12:56:35.40
			135.3 V
1	DEC 12:56:38.50 130.2 V	.	INC 12:56:35.62
			137.3 V
1	INC 12:56:35.78 137.3 V	.	INC 12:56:35.78
			130.2 V
1	INC 12:56:35.62 135.3 V	.	DEC 12:56:38.50
			139.1 V MAX
1	INC 12:56:35.40 133.3 V	1	NORM 11:56:38.51
1	INC 12:56:34.22 131.3 V		
1	INC 12:56:34.21 129.2 V	1	HIGH 11:56:34.21
			139.1 V MAX
1	HIGH 12:56:34.21	1	NORM 12:56:38.51

COPYRIGHT © 1981,1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

The following printout illustrates overvoltage (fig. 2-2) in the MAXIMUM DETAIL mode.

626		626A	
1	DEC 12:56:38.61 119.8 V		119.0 V
		1	INC 12:50:12.34
1	DEC 12:56:38.53 121.8 V		121.1 V
		1	INC 12:56:34.30
1	DEC 12:56:38.51 124.0 V	1	HIGH 12:56:34.21
			129.2 V
1	NORM 12:56:38.51 139.1 V MAX	1	INC 12:56:34.21
			131.3 V
1	DEC 12:56:38.50 130.2 V	1	INC 12:56:34.22
			133.3 V
1	INC 12:56:35.78 137.3 V	1	INC 12:56:35.40
			135.3 V
1	INC 12:56:35.62 135.3 V	1	INC 12:56:35.62
			137.3 V
1	INC 12:56:35.40 133.3 V	1	INC 12:56:35.78
			130.2 V
1	INC 12:56:34.22 131.3 V	1	DEC 12:56:38.50
			139.1 V MAX
1	INC 12:56:34.21 129.2 V	1	NORM 12:56:38.51
			124.0 V
1	HIGH 12:56:34.21	1	DEC 12:56:38.51
			121.8 V
1	INC 12:56:34.30 121.1 V	1	DEC 12:56:38.53
			119.8 V
1	INC 12:50:12.34 119.0 V	1	DEC 12:56:38.61

COPYRIGHT © 1981,1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

The printout generated first (below) shows voltage sag (fig. 2-3) in the NORMAL mode. The second (4-line) printout illustrates voltage sag in the OUT-OF-LIMITS ONLY mode.

626

```
1   NORM   12:17:48.61
    090.1   V  MIN
    SAG  1.25  SEC

1   LOW    12:17:47.36



1   NORM   12:17:48.61
    090.1    V  MIN
    SAG   1.25  SEC

1   INC    12:17:48.60
    103.1 V

1   INC    12:17:48.55
    098.0 V

1   INC    12:17:48.05
    096.0 V

1   INC    12:17:48.96
    094.0 V

1   DEC    12:17:47.39
    091.9 V

1   DEC    12:17:47.37
    094.1 V

1   DEC    12:17:47.36
    101.3 V

1   LOW    12:17:47.36
```

626A

```
1   LOW    12:17:47.36

    101.3 V
1   DEC    12:17:47.36

    094.1 V
1   DEC    12:17:47.37

    091.9 V
1   DEC    12:17:47.39

    094.0 V
1   INC    12:17:48.96

    096.0 V
1   INC    12:17:48.05

    098.0 V
1   INC    12:17:48.55

    103.1 V
1   INC    12:17:48.60

    SAG   1.25 SEC
    090.1  V  MIN
1   NORM   12:17:48.61



1   LOW    12:17:47.36

    SAG  1.25  SEC
    090.1  V  MIN
1   NORM   12:17:48.61
```

COPYRIGHT © 1981,1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

The following printout illustrates voltage sag in the MAXIMUM DETAIL mode.

626

```
1   INC  12:17:48.86
    112.1 V

1   INC  12:17:48.69
    110.1 V

1   INC  12:17:48.62
    108.1 V

1   INC  12:17:48.61
    105.9 V

1   NORM 12:17:48.61
    090.1 V MIN
    SAG 1.25 SEC

1   INC  12:17:48.60
    103.1 V

1   INC  12:17:48.55
    098.0 V

1   INC  12:17:48.05
    096.0 V

1   INC  12:17:47.96
    094.0 V

1   DEC  12:17:47.39
    091.9 V

1   DEC  12:17:47.37
    094.1 V

1   DEC  12:17:47.36
    101.3 V

1   LOW  12:17:47.36

1   DEC  12:17:47.35
    110.8 V

1   INC  12:16:32.15
    113.0 V
```

626A

```
    113.0 V
1   INC  12:16:32.15

    110.8 V
1   DEC  12:17:47.35

1   LOW  12:17:47.36

    101.3 V
1   DEC  12:17:47.36

    094.1 V
1   DEC  12:17:47.37

    091.9 V
1   DEC  12:17:47.39

    094.0 V
1   INC  12:17:47.96

    096.0 V
1   INC  12:17:48.05

    098.0 V
1   INC  12:17:48.55

    103.1 V
1   INC  12:17:48.60

    SAG 1.25 SEC
    090.1 V MIN
1   NORM 12:17:48.61

    105.9 V
1   INC  12:17:48.61

    108.1 V
1   INC  12:17:48.62

    110.1 V
1   INC  12:17:48.69

    112.1 V
1   INC  12:17:48.86
```


COPYRIGHT © 1981,1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

SECTION III
OPERATIONAL TEST

3.1 GENERAL

This section provides information for performing an operational test to verify that the 6002C plug-in is operating properly.

3.2 SYSTEM CHECK

When the PRINTOUT MODE switch is set to SYSTEM CHECK a source of precise signals is applied to the front end circuitry of the 6002C. Any inputs that are connected at this time will be automatically disconnected for the system check period. These signals fully verify the operational integrity of the module. A typical system check printout, as well as the system check signals and the allowable tolerance levels are shown below.

626

```
**********
PRESENT V  120.4 V
IMP   + 152.0 V PK
   626-PA-6002CR2
       CH 1

00/00/00  01:21:10
***SYSTEM CHECK***
```

626A

```
***SYSTEM CHECK***
00/00/00  01:21:10

       CH 1
   626-PA-6002CR2
IMP   + 152.0 V PK
PRESENT V  120.4 V
**********
```

3.3 SYSTEM CHECK SIGNALS

Impulse: +160V pk

Voltage: 120.0 VDC

3.4 SYSTEM CHECK TOLERANCES

F.S. Range	Impulse	Voltage
150	134 to 186 Vpk	118.0 to 122.0 VDC
300	124 to 196 Vpk	117.3 to 122.7 VDC
600	104 to 216 Vpk	115.8 to 124.2 VDC

COPYRIGHT © 1981,1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

APPENDIX A. IMPULSE DURATION OPTION, OPTION 101, FOR 626-PA-6002C PLUG-IN (NOT COMPATIBLE WITH OPTION 101)

A.1 INTRODUCTION

The following paragraphs describe the differences between the 6002C with Option 101 and the standard 6002C.

NOTE

The following data supersedes that found in previous paragraphs of this manual unless otherwise stated.

A.2 PURPOSE

Option 101 is designed to provide information on impulse duration; it has no effect on the measurements made by the standard 6002C described in previous paragraphs.

A.3 EQUIPMENT CHARACTERISTICS

Technical specifications for Option 101 are listed in Table A-1. All specifications for the 6002C, listed in Table 1-1, still apply.

Table A-1. 626-PA-6002C Option 101 Technical Specifications

IMPULSE DURATION	
Range:	1 uSec to 1023 uSec
Accuracy:	±6% of reading ±0.3% F.S., for 1/2 sinewave pulses up to 100 uSec duration greater than 100 Vpk.* Typically -10% at 200 uSec, -20% at 400 uSec, -50% at 1000 uSec.
Timing reference Points:	Start at 25V** - Stop at 30% of Vpk.
Minimum Impulse Voltage:	50 Vpk on 150 Vdc Range 100 Vpk on 300 Vdc Range 200 Vpk on 600 Vdc Range

* 100 Vpk on 150 Vdc Range
200 Vpk on 300 Vdc Range
400 Vpk on 600 Vdc Range

** 25V on 150 Vdc Range
50V on 300 Vdc Range
100V on 600 Vdc Range

COPYRIGHT © 1981,1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

A.4 INSTALLATION IN MAINFRAME

The module is installed in the mainframe in the same manner as the standard 6002C described in paragraph 2.1.

A.5 CONNECTIONS TO THE MODULE

Connecting the 6002C to the line to be monitored is the same as described in paragraph 2.2.

A.6 OPERATING THE 6002C WITH OPTION 101

Operation of the 6002C with Option 101 requires no additional programming steps. Programming is the same as described in paragraph 2.3.2.

A.7 DESCRIPTION OF DATA PRINTOUTS

PROGRAM SUMMARY

When the Program Summary key (designated "PROG") is depressed, the module will be identified as a 626-PA-6002CR1 as in the following example.

626

```
IMPULSE SENS    0100V
VOLTAGE SENS    002V
V LOW LIMIT     105V
V HIGH LIMIT    125V
RANGE F.S.      150V
    626-PA-6002CR1
         CH1
11/17/83   14:45:31
    PROGRAM SUMMARY
```

626A

```
    PROGRAM SUMMARY
11/17/83   14:45:31
         CH1
    626-PA-6002CR1
RANGE F.S.      150V
V HIGH LIMIT    125V
V LOW LIMIT     105V
VOLTAGE SENS    002V
IMPULSE SENS    0100V
```

IMPULSE

When used with the 150V range, a minimum impulse voltage of 50 Vpk is required to obtain duration data. This minimum voltage level increases with range, as shown in Table A-1.

The impulse printout will have the following form:

626

```
4 IMP 12:34:56.88
+ 0257V PK, 089uS
```

626A

```
+ 0257 PK, 089uS
4 IMP 12:34:56.78
```

This printout indicates that an impulse which deviated from the normal bus voltage for 89 microseconds with a peak voltage of 257 volts was detected on channel 4 at the time shown. The "+" preceding the impulse voltage indicates that the impulse was positive with respect to the "-" terminal on the 6002C rear panel.

COPYRIGHT © 1981,1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

Figure A-. illustrates an impulse duration measurement.

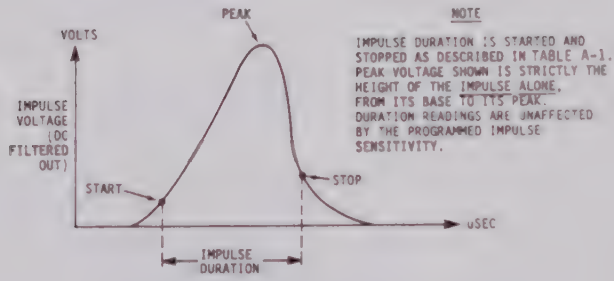

PEAK
VOLTS
IMPULSE VOLTAGE (DC FILTERED OUT)
START
STOP
uSEC
IMPULSE DURATION
NOTE
IMPULSE DURATION IS STARTED AND STOPPED AS DESCRIBED IN TABLE A-1. PEAK VOLTAGE SHOWN IS STRICTLY THE HEIGHT OF THE IMPULSE ALONE, FROM ITS BASE TO ITS PEAK. DURATION READINGS ARE UNAFFECTED BY THE PROGRAMMED IMPULSE SENSITIVITY.

Figure A-1. Impulse Duration Measurement

A.8 PRINTOUT MODES

Printout modes and calibration signals remain the same as in the standard 6002C described in paragraph 2.6.

COPYRIGHT © 1981,1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

APPENDIX B. IMPULSE STRENGTH OPTION, OPTION 102 FOR 626-PA-6002C PLUG-IN (NOT COMPATIBLE WITH OPTION 101)

B.1 INTRODUCTION

The following paragraphs describe the differences between the 6002C with Option 102 and the standard 6002C.

NOTE

The following data supersedes that found in previous paragraphs unless otherwise stated.

B.2 PURPOSE

Option 102 is designed to provide information on impulse strength (volt-second area); it has no effect on the measurements made by the standard 6002C.

B.3 EQUIPMENT CHARACTERISTICS

Technical specifications for Option 102 are listed in Table B-1. All specifications for the 6002C, listed in Table 1-1, still apply.

Table B-1. 626-PA-6002C Option 102 Technical Specifications

IMPULSE STRENGTH

Ranges: 150V F.S. Range 0.0002 to 0.2046 V-Sec
300V F.S. Range 0.0004 to 0.4092 V-Sec
600V F.S. Range 0.0008 to 0.8184 V-Sec

Accuracy: ±10% of reading, ±0.1% of F.S. for 1/2 sinewave pulses up to 100 uSec duration greater than 100 Vpk*. Typically -20% at 200 uSec, -50% at 500 uSec.

* 100 Vpk on 150 Vdc Range
200 Vpk on 300 Vdc Range
400 Vpk on 600 Vdc Range

Timing Reference Points: Start at 25V** - stop at 30% of Vpk.

** 25V on 150 Vdc Range
50V on 300 Vdc Range
100V on 600 Vdc Range

Minimum Impulse Voltage: 50 Vpk on 150 Vdc Range
100 Vpk on 300 Vdc Range
200 Vpk on 600 Vdc Range

COPYRIGHT © 1981,1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

B.4 INSTALLATION IN MAINFRAME

The module is installed in the mainframe in the same manner as the standard 6002C described in paragraph 2.1.

B.5 CONNECTIONS TO THE MODULE

Connecting the 6002C to the line to be monitored is the same as described in paragraph 2.2.

B.6 OPERATING THE 6002C WITH OPTION 102

Operation of the 6002C with Option 102 requires no additional programming steps. Programming is the same as described in paragraph 2.3.2.

B.7 DESCRIPTION OF DATA PRINTOUTS

The only printouts affected by the addition of Option 102 are those for module identification and impulse data.

PROGRAM SUMMARY

When the Program Summary key (designated "PROG") is depressed, the module will be identified as a 626-PA-6002CR2 as in the following example.

626

```
IMPULSE SENS    0100V
VOLTAGE SENS    002V
V LOW LIMIT     105V
V HIGH LIMIT    125V
RANGE F.S.      150V
    626-PA-6002CR2
        CH1
11/17/83   14:51:19
    PROGRAM SUMMARY
```

626A

```
    PROGRAM SUMMARY
11/17/83   14:51:19
        CH1
    626-PA-6002CR2
RANGE F.S.      150V
V HIGH LIMIT    125V
V LOW LIMIT     105V
VOLTAGE SENS    002V
IMPULSE SENS    0100V
```

IMPULSE

When used with the 150 Vdc range, a minimum impulse voltage of 50 Vpk is required to obtain strength data. This minimum voltage level increases with range as shown in Table B-1.

The impulse printout will take the following form:

626

```
4 IMP 12:34:56.88
  0.0156 V-SEC
  +  247V PK
```

626A

```
  +   247V PK
  0.0155 V-SEC
4 IMP 12:34:56.88
```


COPYRIGHT © 1981,1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

This printout indicates that an impulse which deviated from the normal bus voltage with a strength of 0.0.56V-Sec and a peak voltage of 56.7 volts was detected on channel 4 at the time shown. The "+" preceding the impulse voltage indicates that the impulse was positive with respect to the "-" terminal on the 6002C rear panel.

Figure B-1 illustrates an impulse strength (area) measurement.

B.8 Printout Modes

Printout modes and calibration signals remain the same as in the standard 6002C described in paragraph 2.6.

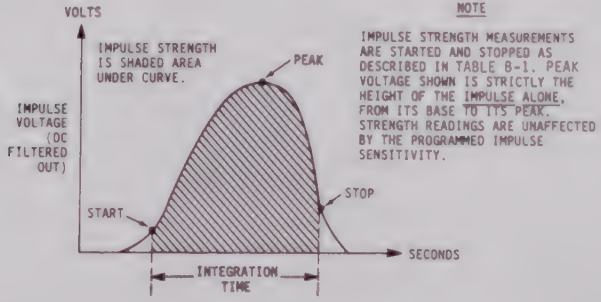

VOLTS
IMPULSE STRENGTH IS SHADED AREA UNDER CURVE.
PEAK
IMPULSE VOLTAGE (DC FILTERED OUT)
START
STOP
SECONDS
INTEGRATION TIME
NOTE
IMPULSE STRENGTH MEASUREMENTS ARE STARTED AND STOPPED AS DESCRIBED IN TABLE B-1. PEAK VOLTAGE SHOWN IS STRICTLY THE HEIGHT OF THE IMPULSE ALONE, FROM ITS BASE TO ITS PEAK. STRENGTH READINGS ARE UNAFFECTED BY THE PROGRAMMED IMPULSE SENSITIVITY.

Figure B-1. Impulse Strength Measurement

COPYRIGHT © 1981,1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

WARNING

Because of possible shock or fire hazards, connection of this instrument should be performed in compliance with the National Electrical Code (ANSI C1) and/or any other requirements which may be applicable to the user.

Installation, operation, and maintenance should be performed only by qualified personnel.

TM-110235U

VOLUME 1

OPERATOR'S MANUAL

626-PA-6003

3-PHASE AC MONITOR

NOTE: Refer to Volume 2 (Service Manual) of TM-110235U for maintenance data

1 May 1984
(Rev. 1 July 1984)
(Rev. 1 September 1985)
(Rev. 1 May 1986)
(Rev. 15 May 1987)

© COPYRIGHT 1981, 1982, 1983, 1984, 1985, 1986, 1987
BY DRANETZ TECHNOLOGIES, INC. EDISON, NEW JERSEY.
ALL RIGHTS RESERVED

DRANETZ

DRANETZ TECHNOLOGIES, INC.
1000 New Durham Rd., PO Box 4019
Edison, New Jersey 08818-4019

NOTICE CONCERNING DRANETZ' PROPRIETARY RIGHTS

This publication contains information proprietary to Dranetz Technologies, Inc. By accepting and using this manual, the user agrees that the information contained herein will be used solely for the purpose of repairing or operating equipment of Dranetz Technologies, Inc. These manuals are to be returned to Dranetz Technologies, Inc. when no longer required by the user, or when there is a change in ownership of the equipment.

These publications are protected under the Copyright laws of the United States Title 17 et seq. No part of this publication may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language or computer language, in any form, by any means, electronic, mechanical, magnetic, optical, chemical, manual, or otherwise, without the expressed written consent of Dranetz Technologies, Incorporated, 1000 New Durham Road, PO Box 4019, Edison, New Jersey 08818-4019.

TABLE OF CONTENTS

626-PA-6003 3-PHASE AC MONITOR

VOLUME 1

Section			Page
I	GENERAL INFORMATION		
	1.1	Scope	1-1
	1.2	Introduction	1-1
	1.3	Purpose	1-1
	1.4	Applications	1-2
	1.5	Equipment Characteristics	1-2
	1.6	Standard Accessories	1-4
	1.7	Optional Accessories	1-4
	1.8	Factory Repair	1-4
II	INSTALLATION AND OPERATION		
	2.1	Installation	2-1
	2.1.1	Selection of Nominal Operating Frequency	2-1
	2.1.2	Installation of 6003 in Mainframe	2-1
	2.1.3	Load Ratings	2-2
	2.2	Connecting Power Source to Module	2-2
	2.2.1	Connection Procedure	2-2
	2.2.2	Circuit Applications	2-3
	2.2.3	Installation Guidelines	2-7
	2.3	Operating the 6003	2-8
	2.3.1	Operating Controls and Indicators	2-8
	2.3.2	Programming Procedure	2-8
	2.4	Selecting the Factory Preset Program	2-12
	2.5	Description of Data Printouts	2-12
	2.5.1	Overvoltage	2-12
	2.5.2	Undervoltage	2-13
	2.5.3	Voltage Change	2-13
	2.5.4	Voltage Surge	2-14
	2.5.5	Voltage Sag	2-14
	2.5.6	Impulses	2-14
	2.5.7	Frequency Change	2-15
	2.6	Printout Modes	2-15
III	OPERATIONAL TEST		
	3.1	General	3-1
	3.2	System Check	3-1

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

LIST OF ILLUSTRATIONS

Figure		Page
2-1	Analog Board Switch Locations	2-1
2-2	Series 626 Controls Used by the 6003 Plug-In	2-9
2-3	Overvoltage Disturbance (6003).	2-16
2-4	Voltage Sag Disturbance (6003).	2-16

LIST OF TABLES

Table		Page
1-1	626-PA-6003 Technical Specifications	1-3
2-1	6003 Operating Controls.	2-10

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

STATEMENT OF WARRANTY

ALL PRODUCTS OF DRANETZ TECHNOLOGIES, INC. ARE WARRANTED TO THE ORIGINAL PURCHASER AGAINST DEFECTIVE MATERIAL AND WORKMANSHIP FOR A PERIOD OF ONE YEAR FROM THE DATE OF DELIVERY. DRANETZ WILL REPAIR OR REPLACE, AT ITS OPTION, ALL DEFECTIVE EQUIPMENT RETURNED, FREIGHT PREPAID, DURING THE WARRANTY PERIOD, WITHOUT CHARGE FOR REPAIR, PROVIDED THERE IS NO EVIDENCE THAT THE EQUIPMENT HAS BEEN MIS-HANDLED OR ABUSED.

NOTE

The information in this manual has been reviewed and is believed to be entirely reliable. However, no responsibility is assumed for any inaccuracies. The material in this manual is for information purposes only, and is subject to change without notice.

VOLUME 1
OPERATOR'S MANUAL

626-PA-6003 3-PHASE AC MONITOR

SECTION 1
GENERAL INFORMATION

1.1 SCOPE

This manual consists of two volumes. Volume 1, the Operator's manual, consists of three sections: I) GENERAL INFORMATION, II) INSTALLATION AND OPERATION, and III) OPERATIONAL CHECK. Volume 2, the Service manual, contains the maintenance instructions.

1.2 INTRODUCTION

This manual provides operating instructions for the 626-PA-6003 Plug-in, hereinafter referred to as the 6003, used in the Series 626 Universal Disturbance Analyzer. It is assumed that the reader is familiar with the mainframe information described in Volume 1 of the Mainframe manual.

1.3 PURPOSE

The 6003 monitors disturbances on 3-phase AC power lines with either 50 or 60 Hz nominal frequency. Each phase is monitored on a single voltage range of 0 to 600 V RMS. With thresholds programmed by the user, the 6003 monitors both short and long term power line disturbances. With this plug-in, the unit stores, analyzes, classifies and prints out quantative disturbance data. Accompanying the data is a printout of time derived from a highly accurate crystal-controlled 24-hour clock in the mainframe.

The plug-in monitors any 3-phase power line whose RMS values range from a low value of 0 volts to as high as 600 volts. Three types of disturbances are monitored by the 6003: power line frequency, power frequency transients and waveform disturbances. Power frequency transients are divided into five display categories: overvoltage, undervoltage, voltage change, voltage surge and voltage sag. Waveform disturbances, identified as "impulses", include all conditions that cause the power line waveform to deviate from an ideal waveform. The 6003 measures the peak amplitude of impulses, their polarity and duration. The threshold value of each type of disturbance, as well as the line frequency, above which detection and printout occurs is operator programmable. (All threshold settings are common to all three line phases.) Except for an automatic summary printout at the end of day, disturbance data is normally printed out only when disturbances occur. In an alternate mode, a disturbance data summary printout occurs only at the end of the day. This feature permits long term unattended operation.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

The threshold program may be easily altered, using the front panel switches. Cueing indicators adjacent to the programming switches simplify the programming procedure. A back-up program for the plug-in, stored in hard memory at the factory, may always be recalled upon operator demand. Both the program and the disturbance data in the data accumulators may be printed out upon demand.

NOTE: Frequency measurements are derived from phase A only. Therefore, if single-phase monitoring is desired, phase A should be used.

1.4 APPLICATIONS

When installed in the 626 mainframe, the 6003 provides the capability of monitoring and evaluating power system performance. Among its typical applications are the following:

a. To determine the effect of power systems operation on equipment malfunction. The time-referenced power fault disturbance record produced by the instrument permits rapid correlation of errors, outages, and equipment damage in computer, industrial process controls, digital communications equipment, medical monitoring apparatus, and so forth, to power line faults.

b. To perform pre-installation site surveys. The 6003 can be used to determine the adequacy of existing power lines intended to support critical electrical equipment. Anticipation of power problems saves time, money, and future trouble.

c. For diagnostic evaluation of power system performance. The portable instrument, particularly well suited for field use, is ideal for determining the probable causes of, and remedies for, power line disturbances.

d. For monitoring life test racks. The printout produced by the instrument provides a clear record of the quality of power supplied during unattended periods.

1.5 EQUIPMENT CHARACTERISTICS

The 6003 is configured as a plug-in module 6.5" high by 1.25" wide by 10" deep. It is designed for installation in one of four slots of the Series 626 Universal Disturbance Analyzer. Technical specifications of the 6003 are presented in Table 1-1.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

Table 1-1. 606-PA-600A Technical Specifications

Input	2 wire differential Z_{in} = 40 Megohms plus 40 pf (each side to ground)
Input Voltage Range	50-600V RMS
Lower Limit of User-Set Voltage (V_{LOW})	50V to 599V
Upper Limit of User-Set voltage (V_{HIGH})	600V to 51V
Voltage Change Sensitivity (V_{SENS}) (1V Increments)	2 to 60V
Line Voltage Measurement Resolution	0.2V
Line Voltage Measurement Accuracy	±1% of reading, ±0.2% of full scale (75V to 600V)
Line Frequency Range Resolution Accuracy	 45-65 Hz ±0.1 Hz ±0.1 Hz
Impulse Range	50-4000V Pk (1-2000 uSec)
Impulse Peak Resolution	1V
Impulse Accuracy	±10% of reading ±1% F.S. (5 uSec-50 uSec.) (decreasing to ±5 dB from 1 uSec to 2 mSec) 100V-4000V
Impulse Duration Range	1 uSec to 2 mSec
Impulse Duration Resolution	1 uSec

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

1.6 STANDARD ACCESSORIES

Model No.	Part No.	Quan.	Description
625PA6003-1 (Barrier, Block Connections)	TM110235U (Vol. 1)	1	Operating Manual
626PA6003-2 (Plug-type Connections)	TM110235U (Vol. 1)	1	Operating Manual
	110480-G1	3	A.C. Cables

1.7 OPTIONAL ACCESSORIES

Part No.	Quan.	Description
TM-110235U (Vol. 2)	1	Service (Maintenance Manual)

1.8 FACTORY REPAIR

When factory repair is desired, proceed as follows:

1. Contact the Dranetz Service Corporation (formerly Dranetz Technologies, Inc., Customer Service Department) in order to obtain an Authorization Number.

   Telephone No: (201) 755-7081

   TWX: (710) 997-9553

   Telex: 499-7808

   Cable: DRANETZ

2. Fill out the REPAIR/SERVICE ORDER enclosed in this manual and ship it with the malfunctioning equipment to the Dranetz Service Corporation.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

SECTION II
INSTALLATION AND OPERATION

2.1 INSTALLATION

2.1.1 Selection of Nominal Operation Frequency

Factory set switches in the 6003 optimize the measurements for a nominal frequency of either 50 or 60 Hz. Figure 2-1 locates these switches on the Analog board of the module. Dots on switches on the figure indicate which side of the switch is to be depressed for 60 Hz. For 50 Hz operation, simply reverse all switch positions.

2.1.2 Installation of 6003 in Mainframe

CAUTION: Be sure that all power is removed from the 626 and modules.

a. With the rear panel markings reading correctly, carefully slide the module into the desired slot, with the Digital board within the card-guide tracks until it is firmly seated.

b. Tighten the top and bottom captive screws to secure the module into the mainframe.

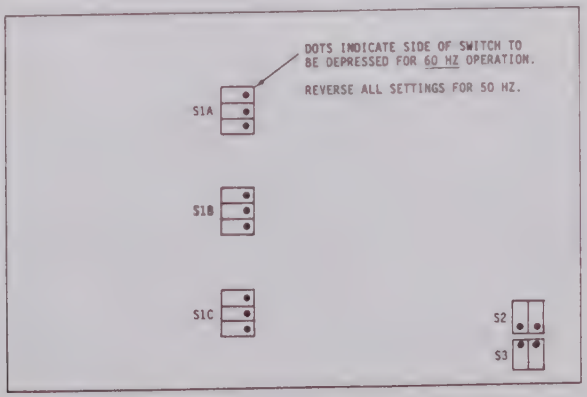


Figure 2-1. Analog Board Switch Locations

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

2.1.3 Load Ratings

The 626 standard mainframe has an upper limit of the total load rating of the installed modules. The overall mainframe capacity is set at 20 units, and individual modules have load rating as follows:

Plug-in	Load Rating
626-PA-6001	2 Units
626-PA-6001 With Extra Option Board	3 Units
626-PA-6002	2 Units
626-PA-6003	4 Units
626-PA-6005	2 Units
626-PA-6006	2 Units
626-PA-6007	1 Unit
626-PA-6008	2 Units
626-PA-6009	4 Units
626-PA-6011	1 Unit
626-PA-6012	2 Units
626-PA-6012A	3 Units
626-PA-6013	2 Units
626-PA-6014	1 Unit
626-PA-6015	4 Units
626-PA-6018	4 Units
626-PA-6020	4 Units

NOTE

When selecting modules for installation in any mainframe, verify that the sum of the load ratings of the installed modules DOES NOT exceed 20.

2.2 CONNECTING POWER SOURCE TO MODULE

2.2.1 Connection Procedure

The 6003 is equipped with either three rear panel AC connectors, or a barrier block. Inputs include phase A, B, and C. Connectors must be wired in accordance with the rear panel connector markings (AC high, AC low, and earth ground from top to bottom).

a. Turn the 626 off by inserting the key in FUNCTION key switch on front panel of mainframe and setting the switch to the OFF position.

b. Turn off power source that is to be monitored by the module.

c. Make all connections to the 6003 module first. If the 6003 has been supplied with connectors, merely insert the mating connector, supplied with the unit, until a "click" is heard.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

If the 4003 has been supplied with a barrier block, make all connections to the barrier block first, then be sure to replace the barrier block cover. DO NOT PROCEED UNTIL PARAGRAPH C IS COMPLETE.

d. Make the desired connections to the power source to be monitored.

e. Power up the 626 by turning the FUNCTION key switch to the OPERATE position.

f. Turn on power source to be monitored.

WARNING: Because of possible shock or fire hazards, connection of this instrument should be performed in compliance with the National Electric Code (ANSI C1) and/or any other requirements applicable to the user.

Installation, operation, and maintenance should be performed only by qualified personnel.

CAUTION: To avoid damaging the equipment, do not apply AC voltages in excess of 600V RMS to any AC phase input (A,B, or C) of the 4003.

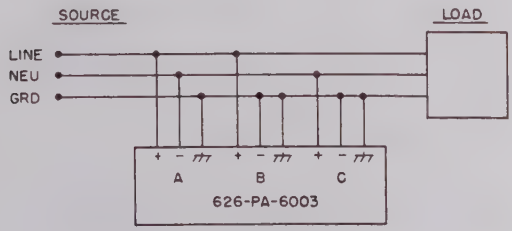
2.2.2 Circuit Applications

WARNING

Connection should only be performed by qualified personnel. Conductors connecting to measurement points should be approved for the specific use. When connected to branch circuits of 20 amperes or less, minimum flexible cord size is No. 18 (1 mm^2). For branch circuits with higher ampacity, refer to National Electric Code (ANSI CI-1975 Para. 240-4 and Para. 250-95). Special consideration of ground may be required. Refer to Article 250 of above reference if in doubt. Outside U.S.A. consult applicable safety standards.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

The 3-phase AC monitor for 45-65 Hz may be used for 30 Wye, 30 Delta, or for up to three separate AC signals. It may be used by itself to do Normal Mode/Common Mode analysis on 1 phase lines, or in combination with a 626-PA-6006 to do Normal Mode/Common Mode analysis on a 3 phase wye line.

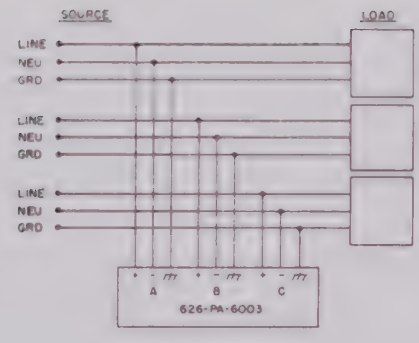


1 Phase Normal Mode/Common Mode

Readings:

Channel A: LINE-Neutral
Channel B: LINE-Ground
Channel C: Neutral-Ground

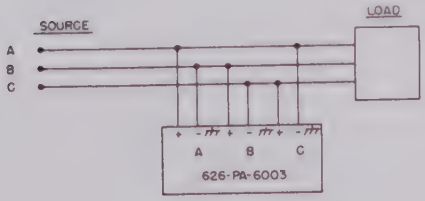
COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.



3 Separate AC Lines

Notes

1. All Channels are monitored independently.
2. All line frequencies must be the same.
3. All 3 channels will have same program set-up.

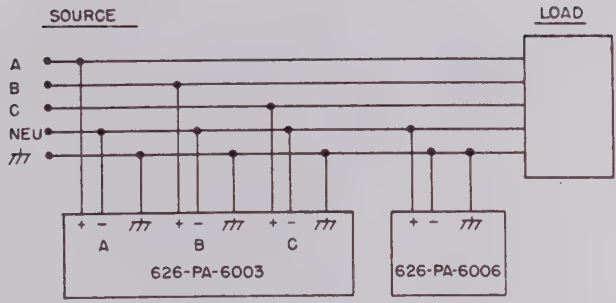


3 Phase Delta

Notes

1. Delta may be grounded or ungrounded
2. Set 626-PA-6003 to monitor line-to-line voltage
   e.g.: For 240 volt delta, set High and Low Limits
   to either side of 240 VAC.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.



3 Phase Wye

Notes

1. 626-PA-6006 is added to perform Neutral-Ground (COMMON mode) monitoring.

2. Wye distribution is normally monitored Line-to-Neutral, e.g., A 120/208 wye would be monitored with 626-PA-6003 High and Low Limits set to either side of 120.

3. To monitor wye system line-to-line, set High and Low Limits to either side of higher stated voltage, and connect to 626-PA-6003 as though lines A, B, and C were from a delta, e.g., A 120/208 wye would be monitored with 626-PA-6003 High and Low Limits set to either side of 208.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

2.2.3 Installation Guidelines

Proper monitoring and analysis of AC and DC voltage disturbances requires careful attention to the method of connection between the Series 626 Universal Disturbance Analyzer and the monitored circuit. To obtain the most accurate and relevant voltage monitoring data, the following suggested guidelines should be utilized.

1. To minimize spurious Impulse transients and interchannel coupling, always use the Dranetz test cables supplied with the 626. If cables are not supplied, such as with the barrier strip input modules, the test cable should be composed of twisted-pair wires for each input channel.

2. Test cable length should be minimized, preferably less than 8 feet from the Series 626 to the circuit connection point. This will minimize amplitude variation of Impulse transients.

3. If monitoring a power line connected to critical, sensitive load equipment, the test cable should be connected to the power line as close as possible to the load. For three-phase loads, the 626 should be connected in the same way as the load equipment, i.e. Phase to Phase or Phase to Neutral.

4. Use of instrument-grade Potential Transformers for monitoring Impulses on high voltage power lines is not recommended. The limited frequency response of most Potential Transformers may result in substantial variation of Impulse amplitude.

5. The Series 626 is designed to operate from disturbed power lines. Therefore, the 626 power supply may be connected to the same power line that is being monitored. However, the user should be aware that the extensive transient suppression incorporated with the 626 power supply may alter the transient characteristics of the AC power line to which the power supply is connected. If the user wishes to prevent alteration of the transient characteristics of the power line being monitored, the 626 power supply input should be separated from the monitored inputs.

6. The ground terminals of the plug-in modules are connected internally to the safety grounding conductor in the 626 power plug. Be careful not to inadvertently contaminate a "clean" ground with a "dirty" ground.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

2.3 OPERATING THE 6003

2.3.1 Operating Controls and Indicators

The functions of the mainframe operating controls and indicators associated with 6003 operation are described in Table 2-1. Figure 2-2 shows the Series 626 controls used by the 6003 module. For a description of controls common to overall Model 626 operation, refer to Volume 1 of the Mainframe manual.

2.3.2 Programming Procedure

Assume it is desired to program a high limit of 125V, a low limit of 105V, voltage sensitivity of 2 volts, frequency sensitivity of 0.2 Hz and an impulse sensitivity of 50V. Voltage and frequency sensitivity sets the deviation from the present value above or below which a detected value produces a recorded disturbance.

For impulse measurements, the sensitivity corresponds to the absolute threshold, so that for an impulse sensitivity of 25 volts, a disturbance is recorded when impulse amplitude rises above 25 volts.

NOTE

1. It is recommended that the HI and LO limits be set to at least 3V (respectively) from the nominal voltage being measured. For example, if monitoring 120V, the high and low limits should be 117V (or less) and 123V (or more), respectively.

2. It is also recommended that the sensitivity be set to at least 2% of the nominal input voltage.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

Figure 2-2. Series 626 Controls Used by the 6003 Plug-In

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

Table 2-1. 6003 Operating Controls

Item	Function
LO LIMIT pushbutton	When depressed, enables numeric keyboard to program low limit voltage.
HI LIMIT pushbutton	When depressed, enables numeric keyboard to program high limit voltage.
SENS pushbutton	When depressed, enables numeric keyboard to program voltage sensitivity value.
IMP SENS pushbutton	When depressed, enables numeric keyboard to program impulse voltage sensitivity value.
F SENS pushbutton	When depressed, enables numeric keyboard to program frequency sensitivity value.
ENTER pushbutton	When depressed, transfers numeric keyboard value into the 6003 memory.
DATA pushbutton	When depressed, produces data summary printout.
PRESET pushbutton	With FUNCTION switch set to PROGRAM and a channel switch (1-5) depressed, depressing PRESET switch recalls non-volatile factory program for that channel.

For the example cited, program the 6003 as follows:

a. Set FUNCTION switch to PROGRAM.

b. Depress the channel pushbutton (1-5) that corresponds to the slot position of the plug-in to be programmed. Note that a program summary for that channel is immediately printed.

c. Note that a cueing indicator above the center bank of pushbuttons lights. This indicates that a function may be programmed.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

i. Depress the HI LIMIT pushbutton. Program the high limit value (125), using the keyboard.

e. When the ENTER indicator lights, depress the ENTER pushbutton. The programmed high limit value will be echoed back on the printout and the ENTER indicator will go out.

f. Repeat steps c, d and e for the low limit voltage (105V) using the LO LIMIT pushbutton.

g. Repeat steps c, d and e for the voltage sensitivity, using the SENS pushbutton and programming the voltage value as 02.

h. Repeat steps c, d and e for the frequency sensitivity (0.2 Hz), using the F SENS pushbutton and programming the value as 0.2.

i. Repeat steps c, d and e for the impulse sensitivity (.005 volts), using the IMP SENS pushbutton. The completed program printout should take the following form:

626*

```
IMPULSE SENS      0050V
FREQ SENS        00.2 HZ
VOLTAGE SENS       002 V
V LOW LIMIT        105 V
V HIGH LIMIT       125 V
     626-PA-6003
         CH 4
```

626A*

```
         CH 4
     626-PA-6003
V HIGH LIMIT       125V
V LOW LIMIT        105V
VOLTAGE SENS      002 V
FREQ SENS       00.2 HZ
IMPULSE SENS      0050V
```

NOTE

The instrument is designed to detect an invalid entry and to automatically shift high and low limits.

j. When the plug-in program is completed, the user may proceed to program another module (by depressing another channel number) or he may place the instrument on line by setting the FUNCTION switch to OPERATE. While on line, the program in effect may be obtained by simply depressing the PROG pushbutton.

---

*If you are using a Model 626, read (from the bottom up) the "626" printouts in this manual; if you are using a Model 626A, read (from the top down) the "626A" printouts instead.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

2.4 SELECTING THE FACTORY PRESET PROGRAM

To select the program stored in hard memory, set the FUNCTION switch to PROGRAM and depress the channel number desired. The last operator-set program will be printed out. Now depress the PRESET pushbutton to recall the factory-set program. An example of this sequence appears below. The printout group generated first is the operator program; the second is the factory program printed after the PRESET button is pressed.

626	626A
IMPULSE SENS 0100V	PROGRAM SUMMARY
FREQ SENS 00.5 HZ	CH 1
VOLTAGE SENS 002V	626-PA-6003
V LOW LIMIT 105 V	V HIGH LIMIT 125 V
V HIGH LIMIT 125 V	V LOW LIMIT 105 V
626-PA-6003	VOLTAGE SENS 002 V
CH 1	FREQ SENS 00.2 HZ
PROGRAM SUMMARY	IMPULSE SENS 0050V
IMPULSE SENS 0050V	PROGRAM SUMMARY
FREQ SENS 00.2 HZ	CH 1
VOLTAGE SENS 002 V	626-PA-6003
V LOW LIMIT 105 V	V HIGH LIMIT 125 V
V HIGH LIMIT 125 V	V LOW LIMIT 105 V
626-PA-6003	VOLTAGE SENS 002 V
CH 1	FREQ SENS 00.5 HZ
PROGRAM SUMMARY	IMPULSE SENS 0100V

2.5 DESCRIPTION OF DATA PRINTOUTS

When any of the disturbances described below is detected by the 6003, it is recorded and displayed in characteristic manner.

2.5.1 Overvoltage

An overvoltage condition exists when the monitored power line voltage exceeds the user-specified upper limit for more than 2.55 seconds. An overvoltage condition is indicated by a printout such as the following:

4B HI 09:46:07.11

where 4 is the channel number, B is the phase and time is given in hours, minutes and seconds (to .01 sec resolution).

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986, 1987
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

When the line voltage recovers to normal, a printout such as the following occurs:

indicating when normal voltage was restored and the value of the highest voltage reached during the overvoltage interval.

2.5.2 Undervoltage

An undervoltage condition exists when the monitored power line voltage remains below the user-specified lower limit for more than 2.56 seconds. An undervoltage condition is indicated by a printout such as the following:

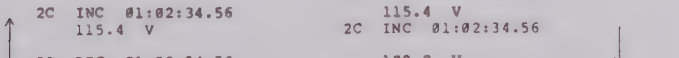
```
4C LO 09:46:15.20
```

When the line voltage returns to normal level, a message such as the following is printed:

indicating when normal voltlage was restored and the value of the lowest voltage reached during the undervoltage interval.

2.5.3 Voltage Change

A voltage change printout is triggered when the line voltage changes more than a preselected amount from the last printed value. The voltage change sensitivity is a user-selected integer voltage between one and 15 volts for a 115-volt line. The following example shows several voltage change printouts. The first shows that Phase A voltage in channel 3 decreased to 109.2V at time shown. The second printout shows that phase C voltage increased to 115.4V at time shown.



COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

2.5.4 Voltage Surge

A Voltage Surge is defined as a line voltage which increases through a user-selected upper limit and then returns to an in-tolerance condition in less than 2.56 seconds. When a surge begins, its starting time is printed as follows:

```
4B   HI   09:45:33.15
```

When the line voltage returns to a normal level following a Surge condition, a message such as the following will be printed:

	626	626A
↑	4B NOR 09:45:33.38	SURGE 0.23 SEC
	128.2 V MAX	128.2 V MAX
	SURGE 0.23 SEC	4B NOR 09:45:33.38 ↓

In this case, the time at which the voltage returned to normal is shown as well as the maximum voltage reached and the surge duration.

2.5.5 Voltage Sag

A voltage Sag is defined as a line voltage that decreases below the user-selected lower limit and then returns to an in-tolerance condition in less than 2.56 seconds. Sag printouts take the same form as surge printouts, with the term SAG replacing the term SURGE, and the term MIN replacing the term MAX.

NOTE

Voltage inputs less than 25V RMS will be printed out as 0.0V on the 6003.

2.5.6 Impulses

"Impulse" disturbances represent any line perturbation which contains frequency components in the 300 Hz to 500 kHz range. An impulse type disturbance produces a printout such as the following:

	626	626A
↑	2A IMP 10:12:13.45	+0139 V, 0010 US
	+0139 V, 0010 US	2A IMP 10:12:13.45 ↓

This printout indicates that an impulse which deviated from normal line voltage by +139 volts peak and whose duration was 10 microseconds was detected on phase A of Channel 2 at the time shown. The impulse magnitude is measured with respect to the instantaneous point on the power frequency sinewave at which it occurs. Impulse polarity is referenced to "+" and "-" markings on rear panel.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

2.5.7 Frequency Change

A frequency change printout is triggered when the line frequency changes more than a preselected amount from the last printed value. The frequency change sensitivity is a user-selected value between 0.2 Hz and 3.0 HZ in 0.1 HZ increments. The following example shows several frequency change printouts.

526	626A
3 FRQ 10:16:27.02 060.5 HZ	060.5 HZ 3 FRQ 10:16:27.02
3 FRQ 10:16:24.32 060.0 HZ	060.0 HZ 3 FRQ 10:16:24.32
3 FRQ 10:16:17.02 059.5 HZ	059.5. HZ 3 FRQ 10:16:17.02

2.6 PRINTOUT MODES

The setting of the PRINTOUT MODE switch on the front panel of the mainframe determines how much detail is printed out. Printout data is reduced as the switch is rotated counterclockwise. The following example printouts show how various settings of the PRINTOUT MODE switch change the amount of detail in the printed record of a disturbance. It is assumed that the disturbances occurred in phase A of Channel 1 and that the limits for Channel 1 were programmed as follows:

V LOW LIMIT	105 Vrms
V HIGH LIMIT	125 Vrms
V SENSITIVITY	2 Vrms

The example printouts are referenced to figures 2-3 and 2-4 which illustrate overvoltage and voltage sag disturbances, respectively.

Disturbances which occur while the PRINTOUT MODE switch is in the SUMMARY ONLY position do not generate individual printouts but they are stored in the daily accumulator and are automatically printed each day at midnight (worst case event and number of occurrences in each category). This printout may also be triggered manually by depressing the DATA button.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

2.5.4 Voltage Surge

A Voltage Surge is defined as a line voltage which increases through a user-selected upper limit and then returns to an in-tolerance condition in less than 2.56 seconds. When a surge begins, its starting time is printed as follows:

```
4B   HI   09:45:33.15
```

When the line voltage returns to a normal level following a Surge condition, a message such as the following will be printed:

	626	626A
↑	4B NOR 09:45:33.38	SURGE 0.23 SEC
	128.2 V MAX	128.2 V MAX
	SURGE 0.23 SEC	4B NOR 09:45:33.38 ↓

In this case, the time at which the voltage returned to normal is shown as well as the maximum voltage reached and the surge duration.

2.5.5 Voltage Sag

A voltage Sag is defined as a line voltage that decreases below the user-selected lower limit and then returns to an in-tolerance condition in less than 2.56 seconds. Sag printouts take the same form as surge printouts, with the term SAG replacing the term SURGE, and the term MIN replacing the term MAX.

NOTE

Voltage inputs less than 25V RMS will be printed out as 0.0V on the 6003.

2.5.6 Impulses

"Impulse" disturbances represent any line perturbation which contains frequency components in the 300 Hz to 500 kHz range. An impulse type disturbance produces a printout such as the following:

	626	626A
↑	2A IMP 10:12:13.45	+0139 V, 0010 US
	+0139 V, 0010 US	2A IMP 10:12:13.45 ↓

This printout indicates that an impulse which deviated from normal line voltage by +139 volts peak and whose duration was 10 microseconds was detected on phase A of Channel 2 at the time shown. The impulse magnitude is measured with respect to the instantaneous point on the power frequency sinewave at which it occurs. Impulse polarity is referenced to "+" and "-" markings on rear panel.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

2.5.7 Frequency Change

A frequency change printout is triggered when the line frequency changes more than a preselected amount from the last printed value. The frequency change sensitivity is a user-selected value between 0.? Hz and 3.0 HZ in 0.. HZ increments. The following example shows several frequency change printouts.

626	626A
3 FRQ 10:16:27.02 060.5 HZ	060.5 HZ 3 FRQ 10:16:27.02
3 FRQ 10:16:24.32 060.0 HZ	060.0 HZ 3 FRQ 10:16:24.32
3 FRQ 10:16:17.02 059.5 HZ	059.5. HZ 3 FRQ 10:16:17.02

2.6 PRINTOUT MODES

The setting of the PRINTOUT MODE switch on the front panel of the mainframe determines how much detail is printed out. Printout data is reduced as the switch is rotated counterclockwise. The following example printouts show how various settings of the PRINTOUT MODE switch change the amount of detail in the printed record of a disturbance. It is assumed that the disturbances occurred in phase A of Channel 1 and that the limits for Channel 1 were programmed as follows:

V LOW LIMIT	105 Vrms
V HIGH LIMIT	125 Vrms
V SENSITIVITY	2 Vrms

The example printouts are referenced to figures 2-3 and 2-4 which illustrate overvoltage and voltage sag disturbances, respectively.

Disturbances which occur while the PRINTOUT MODE switch is in the SUMMARY ONLY position do not generate individual printouts but they are stored in the daily accumulator and are automatically printed each day at midnight (worst case event and number of occurrences in each category). This printout may also be triggered manually by depressing the DATA button.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

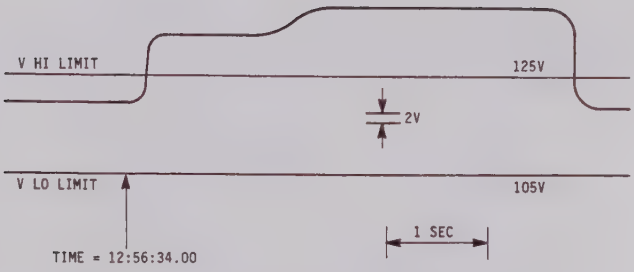


Figure 2-3. Overvoltage Disturbance (6003)

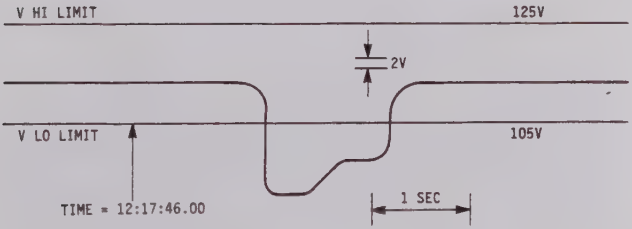


Figure 2-4. Voltage Sag Disturbance (6003)

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

The first printout group generated below illustrates overvoltage (fig. 2-3) in the NORMAL mode. The second (3-line) group illustrates overvoltage in the OUT-OF-LIMITS ONLY mode.

626

```
1A  NOR   12:56:38.51
    139.1  V  MAX
1A  HI    12:56:34.21

1A  NOR   12:56:38.51
    139.1  V  Max
1A  DEC   12:56:38.50
    130.2  V
1A  INC   12:56:35.78
    137.3 V
1A  INC   12:56:35.62
    135.3 V
1A  INC   12:56:35.40
    133.3 V
1A  INC   12:56:34.22
    131.3 V
1A  INC   12:56:34.21
    129.2 V
1A  HI    12:56:34.21
```

626A

```
1A  HI    12:56:34.21
    129.2  V
1A  INC   12:56:34.21
    131.3  V
1A  INC   12:56:34.22
    133.3  V
1A  INC   12:56:35:40
    135.3  V
1A  INC   12:56:35.62
    137.3  V
1A  INC   12:56:35.78
    130.2  V
1A  DEC   12:56:38.50
    139.1  V  MAX
1A  NOR   12:56:39.51

1A  HI    12:56:34.21
    139.1  V  MAX
1A  NOR   12:56:38.51
```

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

The following is a printout of overvoltage (fig. 2-3) in the MAXIMUM DETAIL mode.

626			626A		
				119.0 V	
1A	DEC	12:56:38.61	1A	INC	12:50:12.34
	119.8 V				
				121.1 V	
1A	DEC	12:56:38.53	1A	INC	12:56:34.20
	121.8 V				
1A	DEC	12:56:38.51	1A	HIGH	12:56:34.21
	124.0 V				
				129.2 V	
1A	NORM	12::56:38.51	1A	INC	12:56:34.21
	139.1 V MAX				
				131.3 V	
1A	DEC	12:56:38.50	1A	INC	12:56:34.22
	130.2 V				
				133.3 V	
1A	INC	12:56:35.78	1A	INC	12:56:35:40
	137.3				
				135.3 V	
1A	INC	12:56:35.62	1A	INC	12:56:35.62
	135.3 V				
				137.3 V	
1A	INC	12:56:35.40	1A	INC	12:56:35.78
	133.3 V				
				130.2 V	
1A	INC	12:56:34.22	1A	DEC	12:56:38.50
	131.3 V				
				139.1 V	
1A	INC	12:56:34.21	1A	NORM	12:56:38.51
	129.2 V				
				124.0 V	
1A	HIGH	12:56:34.21	1A	DEC	12:56:38.51
				121.8 V	
1A	INC	12:56:34.20	1A	DEC	12:56:38.53
	121.1 V				
				119.8 V	
1A	INC	12:50:12.34	1A	DEC	12:56:38.61
	119.0 V				

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

The first group of generated printouts below illustrates voltage sag (fig. 2-4) in the NORMAL mode. The second group illustrates voltage sag in the OUT-OF-LIMITS ONLY mode.

626

```
1A  NOR   12:17:48.61
    090.1  V  MIN
    SAG  1.25 SEC

1A  LOW   12:17:47.36

1A  NORM  12:17:48.61
    090.1   V  MIN
    SAG  1.25 SEC

1A  INC   12:17:48.60
    103.1  V

1A  INC  12:17:48.55
    098.0  V

1A  INC   12:17:48.05
    096.0  V

1A  INC   12:17:47.96
    094.0  V

1A  DEC   12:17:47.39
    091.9  V

1A  DEC   12:17:47.37
    094.1  V

1A  DEC   12:17:47.36
    101.3  V

1A  LOW   12:17:47.36
```

626A

```
1A  LOW    12:17:47.36

    101.3   V
1A  DEC    12:17:47.36

    094.1   V
1A  DEC    12:17:47.37

    091.9   V
1A  DEC    12:17:47.39

    094.0   V
1A  INC    12:17:47.96

    096.0   V
1A  INC    12:17:48.05

    098.0   V
1A  INC    12:17:48.55

    103.1   V
1A  INC    12:17:48.60

    SAG   1.25 SEC
    090.1   V  MIN
1A  NORM   12:17:48.61

1A   LOW   12:17:47.36

    SAG  1.25 SEC
    090.1  V   MIN
1A  NOR    12:17:48.61
```

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

The following printout illustrates voltage sag (fig. 2-4) in the MAXIMUM DETAIL mode.

626

```
1A  DEC   12:27:48.86
    112.1  V

1A  INC   12:17:48.69
    110.0  V

1A  INC   12:17:48.62
    108.1  V

1A  INC   12:17:48.61
    105.9

1A  NORM  12:17:48.61
    090.1   V  MIN
    SAG   1.25  SEC

1A  INC   12:17:48.60
    103.1  V

1   INC   12:17:48.55
    098.0  V

1A  INC   12:17:48.05
    096.0  V

1A  INC   12:17:47.96
    094.0  V

1A  DEC   12:17:47.39
    091.9  V

1A  DEC   12:17:47.37
    094.1  V

1A  DEC   12:17:47.36
    101.3  V

1A  LOW   12:17:47.36

1A  DEC   12:17:47.35
    110.8  V

1A  INC   12:16:32.15
    113.0  V
```

626A

```
    113.0   V
1A  INC   12:16:32.15

    110.8   V
1A  DEC   12:17:47.35

1A  LOW   12:17:47.36

    101.3   V
1A  DEC   12:17:47.36

    094.1   V
1A  DEC   12:17:47.37

    091.9   V
1A  DEC   12:17:47.39

    094.0   V
1   INC   12:17:47.96

    096.0   V
1A  INC   12:17:48.05

    098.0   V
1A  INC   12:17:48.55

    103.1   V
1A  INC   12:17:48.60

    SAG   1.25  SEC
    090.1   V  MIN
1A  NORM  12:17:48.61

    105.9   V
1A  INC   12:17:48.61

    108.1   V
1A  INC   12:17:48.62

    110.0   V
1   INC   12:17:48.69

    112.1   V
1   INC   12:27:48.86
```


COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

SECTION III
OPERATIONAL TEST

3.1 GENERAL

This section provides information for performing an operational test to verify that the 6003 plug-in is operating properly.

3.2 SYSTEM CHECK

When the PRINTOUT MODE switch is set to SYSTEM CHECK, a source of precise signals is applied to the front end circuitry of the 6003. Any inputs connected at this time will be automatically disconnected during the system check period. Successful measurement of these signals verifies that the module is fully operational. Expected system check measurement results and allowable tolerances are listed below.

AC Voltage	196.0-204.0 Volts
Impulse Peak	2700-3300 Volts
Impulse Duration	360-440 uSec
Frequency	59.8-60.2 Hz

3.3 SAMPLE SYSTEM CHECK PRINTOUT

A typical system check printout obtained from a 6006 plug-in is illustrated below.

626

```
******************

IMP- 3008V, 0396US
AC VOLTS    199.4V
      PH C
IMP- 3064V, 0395US
AC VOLTS    199.5V
      PH B
IMP- 3103V, 0397US
AC VOLTS    199.8V
      PH A
FRQ    060.0 HZ
   626-PA-6003
      CH 4

TIME = 00:00:12.10
***SYSTEM CHECK***
```

626A

```
***SYSTEM CHECK***
TIME = 00:00:12.10

      CH 4
   626-PA-6003
FRQ    060.0 HZ
      PH A
AC VOLTS    199.8V
IMP- 3103V, 0397US
      PH B
AC VOLTS    199.5V
IMP- 3064V, 0395US
      PH C
AC VOLTS    199.4V
IMP- 3008V, 0396US

******************
```

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

WARNING

Because of possible shock or fire hazards, connection of this instrument should be performed in compliance with the National Electric Code (ANSI C1) or any other requirements, or both, which may be applicable to the user.

Installation, operation, and maintenance should only be performed by qualified personnel.

TM-111805

VOLUME 1 -- OPERATOR'S MANUAL

626-PA-6005

AC CURRENT MONITOR

1 May 1985

(Revised 8/1/85)
(Revised 9/1/85)
(Revised 4/1/86)

See opposite side relative to proprietary rights

NOTE: Refer to Volume 2 (Service Manual) TM-111805 for maintenance information.

© Copyright 1985, 1986
By Dranetz Technologies, Inc.
All Rights Reserved.

DRANETZ®
DRANETZ TECHNOLOGIES, INC.
1000 New Durham Rd., PO Box 4019
Edison, New Jersey 08818-4019

NOTICE REGARDING DRANETZ' PROPRIETARY RIGHTS

This publication contains information proprietary to Dranetz Technologies, Inc. By accepting and using this manual, the user agrees that the information contained herein will be used solely for the purpose of repairing or operating equipment of Dranetz Technologies, Inc. These manuals are to be returned to Dranetz Technologies, Inc. when no longer required by the user, or when there is a change in ownership of the equipment.

These publications are protected under the Copyright laws of the United States Title 17 et seq. No part of this publication may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language or computer language, in any form, by any means, electronic, mechanical, magnetic, optical, chemical, manual, or otherwise, without the prior written permission of Dranetz Technologies, Inc., 1000 New Durham Road, PO Box 4019, Edison, New Jersey 08818-4019.

TABLE OF CONTENTS

626-PA-6005 AC CURRENT MONITOR

VOLUME 1

Section		Page
I	GENERAL INFORMATION	1-1
	1.1 SCOPE	1-1
	1.2 INTRODUCTION	1-1
	1.3 PURPOSE	1-1
	1.4 APPLICATIONS	1-2
	1.5 FEATURES	1-2
	1.6 DISTURBANCE MONITORING	1-2
	1.7 EQUIPMENT CHARACTERISTICS	1-3
	1.8 STANDARD ACCESSORIES	1-5
	1.9 OPTIONAL ACCESSORIES	1-5
	1.10 FACTORY REPAIR	1-5
II	INSTALLATION AND OPERATION	2-1
	2.1 INSTALLATION	2-1
	2.1.1 Load Ratings	2-1
	2.2 CONNECTING THE CURRENT PROBE TO THE PLUG-IN MODULE	2-2
	2.2.1 Current Probe Polarity	2-3
	2.2.2 Circuit Applications	2-3
	2.3 INSTALLATION GUIDELINES	2-4
	2.4 OPERATING THE 6005 PLUG-IN	2-4
	2.4.1 Operating Controls and Indicators	2-5
	2.5 PROGRAMMING PROCEDURE	2-7
	2.5.1 Selecting the Factory Preset Program	2-9
	2.6 DESCRIPTION OF THE DATA PRINTOUTS	2-9
	2.6.1 Overcurrent	2-9
	2.6.2 Undercurrent	2-10
	2.6.3 Current Change	2-10
	2.6.4 Current Surge	2-11
	2.6.5 Current Sag	2-11
	2.6.6 Impulse Disturbances	2-11
	2.7 PRINTOUT MODES	2-12
III	OPERATIONAL TEST	3-1
	3.1 GENERAL	3-1
	3.2 SYSTEM CHECK	3-1
	3.2.1 System Check Signals Example	3-1
	3.2.2 System Check Tolerances	3-1

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

TABLE OF CONTENTS (Continued)

LIST OF ILLUSTRATIONS

Figure		Page
2-1	Proper Connections of the 626-PA-6005 with the TR-2019 Current Probe	2-3
2-2	Series 626 Controls used by the 6005 Plug-in	2-6
2-3	Overcurrent Disturbance (6005)	2-13
2-4	Current Sag Disturbance (6005)	2-13

LIST OF TABLES

Table		Page
1-1	626-PA-6005 AC Current Monitor Technical Specifications	1-3
2-1	Load Ratings	2-1
2-2	626-PA-6005 Operating Controls	2-5

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

STATEMENT OF WARRANTY

ALL PRODUCTS OF DRANETZ TECHNOLOGIES, INC. ARE WARRANTED TO THE ORIGINAL PURCHASER AGAINST DEFECTIVE MATERIAL AND WORKMANSHIP FOR A PERIOD OF ONE YEAR FROM THE DATE OF DELIVERY. DRANETZ WILL REPAIR OR REPLACE, AT ITS OPTION, ALL DEFECTIVE EQUIPMENT RETURNED, FREIGHT PREPAID, DURING THE WARRANTY PERIOD, WITHOUT CHARGE FOR REPAIR, PROVIDED THERE IS NO EVIDENCE THAT THE EQUIPMENT HAS BEEN MISHANDLED OR ABUSED.

The information in this manual has been reviewed and is believed to be entirely reliable. No responsibility, however, is assumed for any inaccuracies. The material in this manual is for information purposes only, and is subject to change without notice.

VOLUME 1
OPERATOR'S MANUAL

626-PA-6005 AC CURRENT MONITOR

SECTION I
GENERAL INFORMATION

1.1 SCOPE

This manual consists of two volumes. Volume 1, the Operator's manual, is divided into three sections: I) GENERAL INFORMATION, II) INSTALLATION AND OPERATION, and III) OPERATIONAL TEST. Volume 2, the Service manual, contains the maintenance instructions and consists of four sections, IV through VII. (See Volume 2 for a description of these sections.)

1.2 INTRODUCTION

This manual provides the operating instructions for the 626-PA-6005 AC Current Monitor plug-in, referred to as the 6005 plug-in. The 6005 plug-in is designed for installation into the Series 626 Universal Disturbance Analyzer Mainframe, referred to as the Series 626. Before reading these instructions, read the Mainframe information described in Volume 1 of the Mainframe manual.

1.3 PURPOSE

The 6005 plug-in is single channel and phase. It enables the Series 626 to detect, measure, and record disturbances in ac current. The 6005 plug-in uses a current transformer for circuit monitoring, which thus eliminates the need for splicing into the circuit. Current input ranges, thresholds, and sensitivity settings are selected from the front panel keyboard.

The 6005 plug-in has an overall range of 0.5 to 300 amps ac, and is programmable in three ranges. With user programmed thresholds, the 6005 plug-in stores, analyzes, classifies, and prints out both qualitative and quantitative disturbance data. The time when each disturbance occurs is also printed out. (Time is measured by a highly accurate crystal-controlled 24-hour clock built into the Series 626 Mainframe.)

Copyright © 1985, 1986
By Dranetz Technologies, Inc.
All Rights Reserved.

1.4 APPLICATIONS

The 6005 plug-in may be used to:

a) track true rms current variations with respect to time,

b) monitor inrush current at sites with power conditioning,

c) analyze operation of protective devices (i.e., circuit breakers, static switches, relays, etc.),

d) detect current impulses, and

e) monitor neutral and ground currents.

1.5 FEATURES

The 6005 plug-in has the following features:

¶ Single Channel, Single Phase Plug-In Module

¶ User Selected Ranges, Thresholds, and Sensitivity

¶ Clamp-On Current Probe Input

¶ Complete Field Compatibility with the Series 626

1.6 DISTURBANCE MONITORING

The 6005 plug-in monitors two types of disturbances: ac current transients and waveform disturbances (impulses).

NOTE

All recorded measurements are in true rms with the exception of current impulses which are measured in peak amperes.

Current transients are divided into into five display categories:

1) Overcurrents
2) Undercurrents
3) Current Changes
4) Current Surges
5) Current Sags

Waveform disturbances (impulses) include all conditions which cause the power line waveform to deviate from an ideal waveform.

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

The threshold value of each disturbance, beyond which a printout occurs, is operator programmable. With the exception of an automatic summary printout at the end of each day, disturbance data is normally printed when the Series 626 is triggered by a disturbance.

In an alternate mode, however, a disturbance data summary printout will only occur at the end of each day. This feature is useful if the unit is operated unattended for long terms.

The threshold program may easily be altered using the front panel key switches. Cueing indicators adjacent to the red, green, and yellow keys simplify the programming procedure. A backup program for the plug-in, which is stored in hard memory at Dranetz Technologies, Inc., may always be recalled upon operator demand. Both the program and disturbance data in the data accumulators may likewise be printed upon demand.

1.7 EQUIPMENT CHARACTERISTICS

The 6005 plug-in module is 6¼" high by 1¼" wide by 10" deep. It is designed for installation into any one of the five slots of the Series 626 Mainframe. Technical specifications of the 6005 plug-in are listed in table 1-1 below.

Table 1-1. 626-PA-6005 AC Current Monitor Technical Specifications

Input Current Frequency:	45 to 65 Hz
Current Measurement Accuracy:	±2% of reading ± 0.5% of full scale
Maximum Crest Factor (Peak/rms):	2 @ 100% full scale 4 @ 50% full scale 7 @ 30% full scale
Impulse Accuracy:	±10% of reading ±1% full scale for half sine wave impulses of 5 to 50 microseconds, typically -6 dB at 2 microsecond and 2 millisecond durations.
Sampling Rate:	20 mSec
TRMS Settling Time Increasing:	15 mSec
Decreasing:	30 mSec

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

Table 1-1. 626-PA-6005 AC Current Monitor Technical Specifications (cont'd)

Range Information

Full Scale Ranges:	75 A rms	150 A rms	300 A rms
Overall Input Range:	1.0 to 75	2.0 to 150	4.0 to 300
Lower Limit of User Set Current (1A incr.):	0 to 74	0 to 149	0 to 299
Upper Limit of User Set Current (1A incr.):	1 to 75	2 to 150	4 to 300
Current Change Sensitivity (1A increments):	1 to 15	2 to 30	4 to 60
True rms Current Resolution:	0.2A rms	0.4A rms	0.8A rms
Impulse Ranges (2 µSec to 1 mSec):	25 to 500 A peak	50 to 1000 A peak	100 to 2000 A peak
User Set Impulse Thresholds (1A incr.):	25 to 500	50 to 1000	100 to 2000

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

1.8 STANDARD ACCESSORIES

Part #	Quantity	Description
TM-111805 Volume 1	1	Operator's Manual
TR-2019	1	Clamp-on Current Probe

1.9 OPTIONAL ACCESSORIES

Part #	Quantity	Description
TM-111805 Volume 2	1	Service (Maintenance) Manual

1.10 FACTORY REPAIR

When factory repair is required, proceed as follows:

1. Contact the Dranetz Service Corporation (formerly Dranetz Technologies, Inc., Customer Service Department) in order to obtain an authorization number for factory repair.

   Telephone No: (201) 755-7081

   TWX: (710) 997-9553

   Telex: 499-7808

   Cable: DRANETZ

2. Fill out the REPAIR/SERVICE ORDER form enclosed in the Series 626 Operating manual. Ship it along with the malfunctioning equipment to the Dranetz Service Corporation.

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

SECTION II
INSTALLATION AND OPERATION

2.1 INSTALLATION

To install the 600[illegible] plug-in into the Mainframe, proceed as follows:

CAUTION

Be sure that the Series 626 Mainframe and all of the power connected to its modules is first turned OFF.

1. Position the top and bottom front corners of the plug-in module into the upper and lower tracks of the desired slot position at the rear of the Series 626 Mainframe.

2. Carefully slide the module into the Mainframe until it is firmly in position.

3. Tighten the top and bottom captive screws in order to secure the module to the Mainframe.

2.1.1 Load Ratings

The Series 626 standard Mainframe has an upper limit of the combined total rating of its installed modules. The overall Mainframe capacity is set at 20 units. The individual modules (existing as of this printing) have the following load ratings:

Table 2-1. Load Ratings

Plug-in	Load Rating	Plug-in	Load Rating
626-PA-6001	2 Units	626-PA-6011	1 Unit
626-PA-6001 with extra option bd.	3 Units	626-PA-6012	2 Units
626-PA-6002	2 Units	626-PA-6012A	3 Units
626-PA-6003	4 Units	626-PA-6013	2 Units
626-PA-6005	2 Units	626-PA-6014	1 Unit
626-PA-6006	2 Units	626-PA-6015	4 Units
626-PA-6007	1 Unit	626-PA-6018	4 Units
626-PA-6008	2 Units	626-PA-6020	4 Units
626-PA-6009	4 Units		

NOTE

When selecting modules for installation into any Series 626 Mainframe, verify that the sum of the load ratings of the installed modules DOES NOT exceed 20 Units.

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

2.2 CONNECTING THE CURRENT PROBE TO THE PLUG-IN MODULE

CAUTION

To avoid damaging the equipment, DO NOT measure ac voltages in excess of 600 V rms with the 6005 plug-in.

WARNING

Because of possible shock or fire hazards, connection of this instrument should be performed in compliance with the National Electric Code (ANSI C1), or any other requirements, or both, which may be applicable to the user.

Installation, operation, and maintenance should only be performed by qualified personnel.

The 6005 plug-in is supplied with a 4-pin connector. To connect the current probe to the 6005 plug-in, proceed as follows:

1. Turn OFF the ac power to the line that is going to be monitored.
2. Insert the key into the FUNCTION key switch on the front panel of the Series 626 Mainframe. Turn the key counterclockwise to the "OFF" position (if it is not already in such a position).
3. Insert the connector into the connector port on the rear panel of the 6005 plug-in. Press the connector firmly into place until a snap is heard.

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

2.2.1 Current Probe Polarity

Figure 2-1 below illustrates the proper polarity required for the current probe connection.

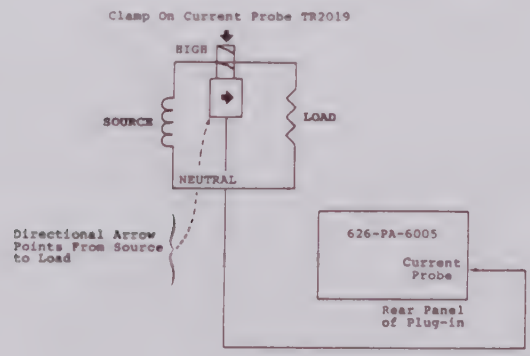


Figure 2-1. Proper Connections of the 626-PA-6005 with the TR-2019 Current Probe

2.2.2 Circuit Applications

WARNING

Connection should ONLY be performed by qualified personnel. Conductors connecting to measurement points should be approved for the specific use. When connected to branch circuits of 20 amperes or less, the minimum flexible cord size is No. 18 (1 mm^2). For branch circuits with higher ampacity, refer to the National Electric Code (ANSI C1-1975 Paragraphs 240-4 and 250-95). Special consideration of ground may be required. Refer to Article 250 of the above reference if in doubt. Outside of the U.S.A., consult any applicable safety standards.

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

2.3 Installation Guidelines

To properly monitor and analyze ac current disturbances, pay careful attention to the method of connection between the Series 626 and the monitored circuit. Follow the below guidelines to obtain the most accurate and relevant data from the monitored current.

- If you are monitoring a power line which is connected to critical, sensitive load equipment, connect the test cable as close to the load end of the power line as possible. For three-phase loads, connect the Series 626 in the same way as the load equipment, i.e., phase-to-phase or phase-to-neutral.

- It is NOT RECOMMENDED that you use instrument-grade current and potential transformers for monitoring impulses on high current/voltage power lines. The limited frequency response of most instrument-grade transformers may result in substantial variation of impulse amplitude.

- The Series 626 is designed to operate from disturbed power lines; therefore, you may connect the Series 626 power supply to the same power line that is being monitored. However, be aware that the extensive transient suppression, incorporated with the Series 626 power supply, may alter the transient characteristics of the ac power line to which the power supply is connected. To prevent alteration of the transient characteristics of the monitored power line, separate the Series 626 power supply input from the monitored inputs.

2.4 OPERATING THE 6005 PLUG-IN

Table 2-2 on the following page lists the operating controls and indicators of the Series 626 that are used by the 6005 plug-in. Figure 2-2 on the page after illustrates these controls on a typical front panel layout. (Only those keys used by the 6005 plug-in are labeled on the front panel illustration.) For a description of the controls common to overall Series 626 operation, refer to Volume 1 of the Mainframe manual.

Copyright © 1985, 1986
By Dranetz Technologies, Inc.
All Rights Reserved.

2.4.1 Operating Controls and Indicators

The 6005 plug-in uses a menu-style format for selecting items and thresholds.

Table 2-2. 626-PA-6005 Operating Controls

ITEM	FUNCTION
Numeric Keyboard *	To select menu items & set thresholds.
Numeric Keyboard LEDs	The number of lit LEDs indicates the number of digits required for an entry.
[RANGE] key and LED	When the LED lights, the user should depress [RANGE], and then enter the desired full scale current range (075, 150, or 300) via the numeric keyboard.
[LO LIMIT] key	When depressed, enables numeric keyboard to program the current low limit.
[HI LIMIT] key	When depressed, enables numeric keyboard to program current high limit.
[SENS] key	When depressed, enables numeric keyboard to program the current sensitivity value.
[IMP SENS] key	When depressed, enables the numeric keyboard to program the impulse sensitivity value.
[ENTER] key	When depressed, transfers numeric keyboard entry into 6005 plug-in memory.
[DATA] push button	With the FUNCTION key switch set at "OPERATE", depressing [DATA] produces a data summary printout.
[PROG] push button	With the FUNCTION key switch set at "OPERATE", depressing [PROG] produces a program summary printout.
[PRESET] push button	With the FUNCTION key switch set at "PROGRAM" and a channel push button (1-5) depressed, depressing [PRESET] returns all of the programmed parameters of that channel to their "Factory Preset" values.
OTHER FRONT PANEL CONTROLS AND INDICATORS	Refer to Volume 1 of the Series 626 Mainframe Manual (Operator's Manual).

* -"Key" and "keyboard" represent the red, green, and yellow keys. "Push button" represents the black selector buttons.

Copyright © 1985, 1986
By Dranetz Technologies, Inc.
All Rights Reserved.

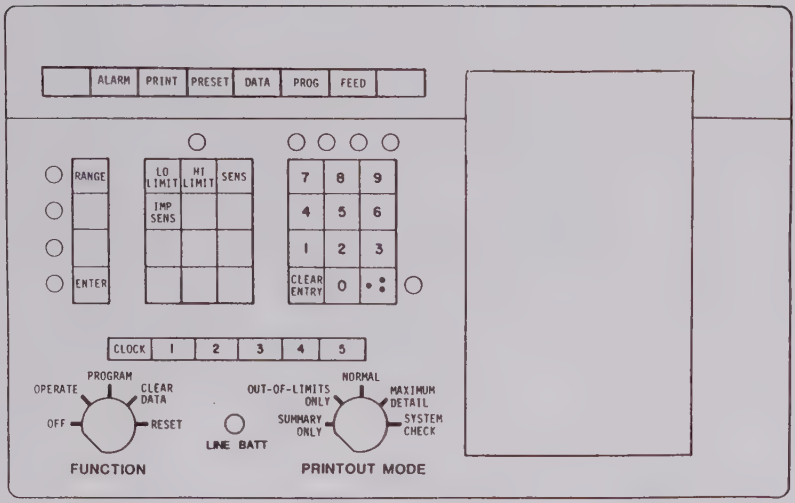


Figure 2-2. Series 626 Controls used by the 6005 Plug-in

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

2.5 PROGRAMMING PROCEDURE

The best way to explain the programming of the 6005 plug-in (via the Series 626) is through an illustrated example. Assume that you want to program the Series 626 for:

1. A full scale range of 150 amps.
2. A high limit of 125 amps.
3. A low limit of 105 amps.
4. Current sensitivity of 2 amps.
5. Impulse sensitivity of 100 amps.

Current sensitivity sets the deviation threshold from the present value (2 amps in this example). A current deviation of 2 or more amps will cause the Series 626 to record the disturbance.

For impulse measurements, the impulse sensitivity corresponds to the absolute threshold. For an impulse sensitivity of 100 amps (this example), a disturbance would be recorded when the impulse amplitude (spike) is 100 amps or greater.

For the above example, program the Series 626 as follows:

a) Turn the FUNCTION key to the "PROGRAM" position.

b) Depress the channel push button (1-5) which corresponds to the slot position of the 6005 plug-in. Note that the program summary for the channel is immediately printed.

c) Note that the red LED adjacent to the [RANGE] key lights. Depress [RANGE].

d) Note that the three yellow LEDs above the numeric keyboard now light. The following is printed:

626*

```
075 150 OR 300A FS
RANGES:
ENTER ONE OF THREE
```

626A*

```
ENTER ONE OF THREE
RANGES:
075 150 OR 300A FS
```

Using the numeric keyboard, enter [1][5][0]. One lamp will go out for every digit entered. This selects the first full scale range (1.0 to 150 amps). If an error is made during entry, depress [CLEAR ENTRY] and re-enter the entire entry.

e) Once the full scale value has been programmed, the green LED adjacent to the [ENTER] key lights. Depress this key to enter the value into memory. The full scale entry, "RANGE P.S. 150 A", will be echoed back on a printout.

---

* -If you are using a Model 626, read (from the bottom up) the "626" printouts in this manual; if you are using a Model 626A, read (from the top down) the "626A" printouts instead.

Copyright © 1985, 1986
By Dranetz Technologies, Inc.
All Rights Reserved.

f) One red LED above the center bank of keys will light. This indicates the unit is ready for another programmed function.

g) Depress the [HI LIMIT] key. Program the high limit value, [1][2][5], as in step d.

h) Depress [ENTER]. The programmed high limit will be echoed back in a printout: "HIGH LIMIT 125 A".

i) Repeat steps f, g, and h for the low limit value, [1][0][5], using the [LO LIMIT] key in place of the [HI LIMIT] key. The programmed low limit will be: "LOW LIMIT 105 A".

j) Repeat steps f, g, and h for the current sensitivity (2 amps), using the [SENS] key and programming the current value as [0][2]. The programmed current sensitivity will be printed: "SENSITIVITY 002 A".

k) Repeat steps f, g, and h for the impulse sensitivity (100 amps), using the [IMP SENS] key and programming the impulse sensitivity as [0][1][0][0]. The programmed impulse sensitivity will be printed as: "IMPULSE SENS 0100A".

l) Turn the FUNCTION key counterclockwise to the "OPERATE" position, and then immediately back to "PROGRAM". The program summary will be printed as follows:

626

```
IMPULSE SENS 0100 A
SENSITIVITY  002  A
LOW LIMIT    105  A
HIGH LIMIT   125  A
RANGE F.S.   150  A
   626-PA-6005
      CH #
PROGRAM SUMMARY
```

626A

```
PROGRAM SUMMARY
      CH #
   626-PA-6005
RANGE F.S.   150  A
HIGH LIMIT   125  A
LOW LIMIT    105  A
SENSITIVITY  002  A
IMPULSE SENS 0100 A
```

NOTE

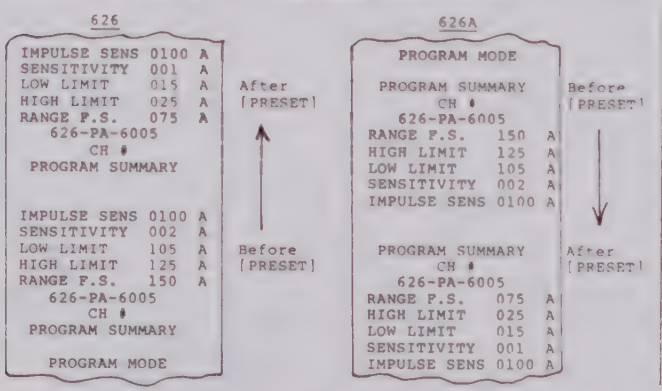
The instrument is designed to detect an invalid entry and to automatically shift high and low limits if the range is changed without first reprogramming the limits. For example: If you select a full scale value of 150 A, and you then try to select 153 A as the low limit, the Series 626 will print the error message "ENTRY TOO HIGH". The yellow LEDs will relight, awaiting another entry.

When the 6005 plug-in program is completed, you may proceed to program another module (by depressing another channel number), or place the instrument on-line by turning the FUNCTION key counterclockwise to the "OPERATE" position. While on-line, you may print the program summary by depressing the [PROG] push button.

Copyright © 1985, 1986
By Dranetz Technologies, Inc.
All Rights Reserved.

2.5.1 Selecting The Factory Preset Program

To select the program stored in hard memory, turn the FUNCTION key to the "PROGRAM" position, and depress 6005 plug-in's channel number. The most recent operator-set program will be primed. Depress the [PRESET] push button to recall the "Factory Preset" program. An example of this sequence appears below:



Afterwards, turn the FUNCTION key back to "OPERATE". The "Factory Preset" program will be retained in the memory and the previous program setup will be erased.

2.6 DESCRIPTION OF THE DATA PRINTOUTS

When any of the disturbances in the subsections below are detected by the 6005 plug-in, they are recorded and displayed in the described manner.

2.6.1 Overcurrent

An overcurrent condition exists when the monitored ac line current exceeds the user-specified upper limit for more than 2.55 seconds. The beginning of an overcurrent condition is indicated by a printout such as the following:

```
2 HIGH 12:34:56.78
```

Where: 2 is the channel number, HIGH indicates overcurrent, and time is given in hrs:min:sec (to .01 second resolution).

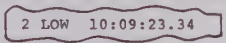
Copyright © 1985, 1986
By Dranetz Technologies, Inc.
All Rights Reserved.

When the ac current returns to its in-tolerance range, a printout such as the following is displayed:

This printout indicates the time when the normal current was restored and the value of the highest current reached during the overcurrent condition (in this case, 145.2 amps).

2.6.2 Undercurrent

An undercurrent condition exists when the monitored power line current remains below the user-specified lower limit for more than 2.55 seconds. The beginning of an undercurrent condition is indicated by a printout such as the following:



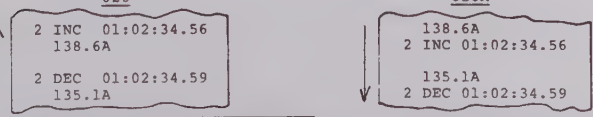
Where: LOW indicates the undercurrent.

When the current returns to its in-tolerance range, a message such as the following is printed:

This printout indicates the time when the normal current was restored and the lowest current value achieved during the undercurrent interval.

2.6.3 Current Change

A current change printout is triggered when the line current changes more than a selected amount from the most recently printed value.* The sensitivity is a user-selected value varying with the full scale range selected. For example, in the 150 amp range, a sensitivity between the range of 2 to 30 amps may be selected. The following example illustrates two current change printouts (an increase to 138.6 A and a decrease to 135.1 A).



* -If the current change occurs within the same waveform cycle, an increase or decrease greater than the selected sensitivity may be printed.

Copyright © 1985, 1986
By Dranetz Technologies, Inc.
All Rights Reserved.

2.6.4 Current Surge

A current surge is defined as an ac current which increases through a user-selected upper limit and then returns to an in-tolerance range in less than 2.56 seconds. When a surge begins, its starting time is printed as follows:

```
2 HIGH 12:34:50.49
```

When the ac current returns to an in-tolerance range following a surge condition, a message such as the following is printed:

626

```
2 NORM 12:34:51.59
  135.2 A MAX
  SURGE 1.10 SEC
```

626A

```
  SURGE 1.10 SEC
  135.2 A MAX
2 NORM 12:34:51.59
```

The time when the current level returned to its in-tolerance range is printed, as well as the maximum current reached, and the duration of the surge.

2.6.5 Current Sag

A current sag is defined as a line current which decreases below the user-selected lower limit and then returns to an in-tolerance range in less than 2.56 seconds. When a sag begins, its starting time is printed as follows:

```
2 LOW  12:34:54.45
```

When the ac current returns to an in-tolerance range following a sag condition, a message such as the following is printed:

626

```
2 NORM 12:34:55.45
  104.5 A MIN
  SAG   1.10 SEC
```

626A

```
  SAG 1.10 SEC
  104.5 A MIN
2 NORM 12:34:55.45
```

The time when the current level returned to its in-tolerance range is printed, as well as the minimum current reached and the duration of the sag.

2.6.6 Impulse Disturbances

"Impulse" disturbances (spikes) represent any line perturbation which contains frequency components within the 300 Hz to 500 kHz range. An impulse type disturbance produces a printout such as the following:

626

```
2 IMP  10:12:13.45
  +0139 A PK
```

626A

```
  +0139 A PK
2 IMP 10:12:13.45
```

Copyright © 1985, 1986
By Dranetz Technologies, Inc.
All Rights Reserved.

This printout indicates that an impulse, which deviated from normal ac current by +139 amps peak, was detected on channel 2 at the time shown.

2.7 PRINTOUT MODES

The setting of the PRINTOUT MODE key switch on the front panel of the Mainframe determines the amount of detail which is printed out. The amount of detail ranges from a minimum amount with the key switch set in the "SUMMARY ONLY" position, to a maximum amount with the key switch set at "MAXIMUM DETAIL". The "OUT-OF-LIMITS ONLY" and "NORMAL" positions are the intermediate detail settings.

The example printouts on the next several pages illustrate how various settings of the PRINTOUT MODE key switch change the amount of detail in the printed recording of an overcurrent and current sag disturbance. For the examples, assume the disturbances occurred in channel 2, and the limits for channel 2 were programmed as follows:

SENSITIVITY	002 A
LOW LIMIT	105 A
HIGH LIMIT	125 A
RANGE F.S.	150 A

The following example printouts are referenced to figures 2-3 and 2-4 which illustrate an overcurrent and current sag disturbance.

Disturbances which occur while the PRINTOUT MODE key switch is in the "SUMMARY ONLY" position, do not generate individual printouts, but are stored in the daily accumulator and are automatically printed out each day at midnight. The contents of the daily accumulator may be manually triggered at any time by depressing the [DATA] push button.

Copyright © 1985, 1986
By Dranetz Technologies, Inc.
All Rights Reserved.

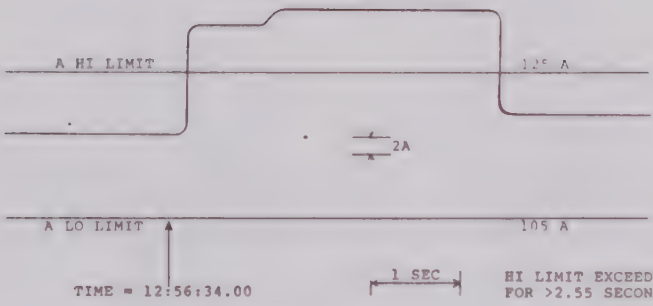


Figure 2-3. Overcurrent Disturbance (6005)

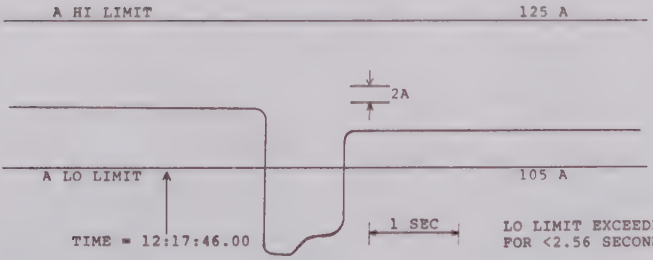


Figure 2-4. Current Sag Disturbance (6005)

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

Printout of overcurrent (fig 2-3) in "OUT-OF-LIMITS" mode.

626

```
2 NORM 12:56:38.51
  139.1 A MAX

2 HIGH 12:56:34.21
```

626A

```
2 HIGH 12:56:34.21

  139.1 A MAX
2 NORM 12:56:38.51
```

Note that in the above printout, the time when the overcurrent was recorded is displayed (HIGH). When the current fell back to its in-tolerance range, the time was displayed along with the maximum current achieved. This is a typical display of an overcurrent while the unit is set in the "OUT-OF-LIMITS ONLY" mode.

Printout of overcurrent in "NORMAL" mode.

626

```
2 NORM 12:56:38.51
  139.1 A MAX

2 DEC  12:56:38.50
  130.2A

2 INC  12:56:35.78
  137.3A

2 INC  12:56:35.62
  135.3A

2 INC  12:56:35.40
  133.3A

2 INC  12:56:34.22
  131.3A

2 INC  12:56:34.21
  129.2A

2 HIGH 12:56:34.21
```

626A

```
2 HIGH 12:56:34.21

  129.2A
2 INC  12:56:34.21

  131.3A
2 INC  12:56:34.22

  133.3A
2 INC  12:56:35.40

  135.3A
2 INC  12:56:35.62

  137.3A
2 INC  12:56:35.78

  130.2A
2 DEC  12:56:38.50

  139.1A MAX
2 NORM 12:56:38.51
```

Note that in the above printout, and unlike the printout at the top of the page, any increase or decrease of 2 amps or more while the current is out-of-limits (out of in-tolerance), is displayed along with the time. This is a typical display of an overcurrent while the unit is set in the "NORMAL" mode.

Copyright © 1985, 1986
By Dranetz Technologies, Inc.
All Rights Reserved.

Printout of overcurrent (fig 2-3) in "MAXIMUM DETAIL" mode.

626

```
2 DEC  12:56:38.61
  119.8A

2 DEC  12:56:38.53
  121.8A

2 DEC  12:56:38.51
  124.0A

2 NORM 12:56:38.51
  139.1 A MAX

2 DEC  12:56:38.50
  130.2A

2 INC  12:56:35.78
  137.3A

2 INC  12:56:35.62
  135.3A

2 INC  12:56:35.40
  133.3A

2 INC  12:56:34.22
  131.3A

2 INC  12:56:34.21
  129.2A

2 HIGH 12:56:34.21

2 INC  12:56:34.30
  121.1A

2 INC  12:50:12.34
  119.0A
```

626A

```
  119.0A
2 INC  12:50:12.34

  121.1A
2 INC  12:56:34.30

2 HIGH 12:56:34.21

  129.2A
2 INC  12:56:34.21

  131.3A
2 INC  12:56:34.22

  133.3A
2 INC  12:56:35.40

  135.3A
2 INC  12:56:35.62

  137.3A
2 INC  12:56:35.78

  130.2A
2 DEC  12:56:38.50

  139.1 A MAX
2 NORM 12:56:38.51

  124.0A
2 DEC  12:56:38.51

  121.8A
2 DEC  12:56:38.53

  119.8A
2 DEC  12:56:38.61
```

Note that in the above printout, the increases and decreases in the level of current between (HIGH) and (NORM) are printed. But unlike the "NORMAL" mode display, all of the increases and decreases in the level of current ($\leq$ 2 amps) are displayed, not just those above the HIGH LIMIT setting. This is a typical display of an overcurrent while the unit is set in the "MAXIMUM DETAIL" mode.

Copyright © 1985, 1986
By Dranetz Technologies, Inc.
All Rights Reserved.

Printout of current sag (fig 2-4) in "OUT-OF-LIMITS" mode.

626

```
2 NORM 12:17:48.61
  090.1 A MIN
  SAG 1.25 SEC

2 LOW  12:17:47.36
```

626A

```
2 LOW  12:17:47.36

  SAG 1.25 SEC
  090.1 A MIN
2 NORM 12:17:48.61
```

Note that the above printout takes the same format as the overcurrent display in the "OUT-OF-LIMITS ONLY" mode, with MIN replacing MAX, and LOW replacing HIGH. The duration of the sag is also displayed (SAG). This is a typical display of a sag while the unit is set in the "OUT-OF-LIMITS ONLY" mode.

Printout of current sag (fig 2-4) in "NORMAL" mode.

626

```
2 NORM 12:17:48.61
  090.1 A MIN
  SAG 1.25 SEC

2 INC  12:17:48.60
  103.1A

2 INC  12:17:48.55
  098.0A

2 INC  12:17:48.05
  096.0A

2 INC  12:17:47.96
  094.0A

2 DEC  12:17:47.39
  091.9A

2 DEC  12:17:47.37
  094.1A

2 DEC  12:17:47.36
  101.3A

2 LOW 12:17:47.36
```

626A

```
2 LOW 12:17:47.36

  101.3A
2 DEC 12:17:47.36

  094.1A
2 DEC 12:17:47.37

  091.9A
2 DEC 12:17:47.39

  094.0A
2 INC 12:17:47.96

  096.0A
2 INC 12:17:48.05

  098.0A
2 INC 12:17:48.55

  103.1A
2 INC 12:17:48.60

  SAG 1.25 SEC
  090.1 A MIN
2 NORM 12:17:48.61
```

Note that the above printout takes the same format as the overcurrent display in the "NORMAL" mode, with MIN replacing MAX, and LOW replacing HIGH. The duration of the sag is also displayed (SAG). This is a typical display of a sag while the unit is set in the "NORMAL" mode.

Copyright © 1985, 1986
By Dranetz Technologies, Inc.
All Rights Reserved.

Printout of current sag (fig 2-4) in "MAXIMUM DETAIL" mode.

626

```
2 INC  12:17:48.86
  112.1A

2 INC  12:17:48.69
  110.1A

2 INC  12:17:48.62
  108.1A

2 INC  12:17:48.61
  105.9A

2 NORM 12:17:48.61
  090.1 A MIN
  SAG 1.25 SEC

2 INC  12:17:48.60
  103.1A

2 INC  12:17:48.55
  098.0A

2 INC  12:17:48.05
  096.0A

2 INC  12:17:47.96
  094.0A

2 DEC  12:17:47.39
  091.9A

2 DEC  12:17:47.37
  094.1A

2 DEC  12:17:47.36
  101.3A

2 LOW  12:17:47.36

2 DEC  12:17:47.35
  110.8A

2 INC  12:16:32.15
  113.0A
```

626A

```
  113.0A
2 INC 12:16:32.15

  110.8A
2 DEC 12:17:47.35

2 LOW 12:17:47.36

  101.3A
2 DEC 12:17:47.36

  094.1A
2 DEC 12:17:47.37

  091.9A
2 DEC 12:17:47.39

  094.0A
2 INC 12:17:47.96

  096.0A
2 INC 12:17:48.05

  098.0A
2 INC 12:17:48.55

  103.1A
2 INC 12:17:48.60

  SAG 1.25 SEC
  090.1 A MIN
2 NORM 12:17:48.61

  105.9A
2 INC 12:17:48.61

  108.1A
2 INC 12:17:48.62

  110.1A
2 INC 12:17:48.69

  112.1A
2 INC 12:17:48.86
```

Note that the above printout takes the same format as the over-current display in the "MAXIMUM DETAIL" mode, with LOW replacing HIGH and MIN replacing MAX. This is a typical display of a sag while the unit is in the "MAXIMUM DETAIL" mode.

Copyright © 1985, 1986
By Dranetz Technologies, Inc.
All Rights Reserved.

SECTION III
OPERATIONAL TEST

3.1 GENERAL

This section provides information for performing an operational test to verify that the 6005 plug-in is operating properly.

3.2 SYSTEM CHECK

1) Turn the PRINTOUT MODE key momentarily to the "SYSTEM CHECK" position, and then back to "NORMAL".

A source of precise signals is applied to the front-end circuitry of the plug-in. Any inputs connected at this time will be automatically disconnected for the duration of the system check. The signals fully verify the plug-in module's operational integrity.

2) Compare the actual displayed readings with those in Subsection 3.2.2 below. If any readings are out of range, contact the Dranetz Service Corporation (see subsection 1.10, FACTORY REPAIR).

3.2.1 System Check Signals Example

The following example printout illustrates the nominal values for the impulse (IMP) and current (PRESENT A). Note that these values (10A, and 150 A PK) are within the listed tolerances. When performing a system check, any values obtained which are within the given tolerances verify the operation of the 6005 plug-in.

626

```
**********
PRESENT A 010.0A
IMP   + 0150 A PK
   626-PA-6005
        CH #

01/17/85  16:29:54
***SYSTEM CHECK***
```

626A

```
***SYSTEM CHECK***
01/17/85  16:29:54

        CH #
   626-PA-6005
IMP   + 0150 A PK
PRESENT A 010.0A
**********
```

3.2.2 System Check Tolerances

F.S. Range	Impulse	Current
75	137 to 162 A pk	9.8 to 10.3 A
150	132 to 167 A pk	9.6 to 10.4 A
300	122 to 177 A pk	9.3 to 10.7 A

Copyright © 1985, 1986
By Dranetz Technologies, Inc.
All Rights Reserved.

WARNING

Because of possible shock or fire hazards, connection of this instrument should be performed in compliance with the National Electrical Code (ANSI CI) and/or any other requirements which may be applicable to the user.

Installation, operation, and maintenance should be performed only by qualified personnel.

TM-110390AU

VOLUME I

OPERATORS'S MANUAL

526-PA-6006

AC NEUTRAL MONITOR

NOTE

Refer to Volume 2 (Service Manual) of TM-110390AU for maintenance data.

1 May 1984
(Rev. 1 Sept. 1985)
(Rev. 1 May 1986)
(Rev. 15 May 1987)

© COPYRIGHT 1981, 1982, 1983, 1984, 1985, 1986, 1987
BY DRANETZ TECHNOLOGIES, INC. EDISON, NEW JERSEY.
ALL RIGHTS RESERVED

DRANETZ
DRANETZ TECHNOLOGIES, INCORPORATED
1000 New Durham Rd., PO Box 4019, Edison, NJ 08818-4019

NOTICE CONCERNING DRANETZ' PROPRIETARY RIGHTS

This publication contains information proprietary to Dranetz Technologies, Inc. By accepting and using this manual, the user agrees that the information contained herein will be used solely for the purpose of repairing or operating equipment of Dranetz Technologies, Inc. These manuals are to be returned to Dranetz Technologies, Inc. when no longer required by the user, or when there is a change in ownership of the equipment.

These publications are protected under the Copyright laws of the United States Title 17 et seq. No part of this publication may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language or computer language, in any form, by any means, electronic, mechanical, magnetic, optical, chemical, manual, or otherwise, without the expressed written consent of Dranetz Technologies, Incorporated, 1000 New Durham Road, PO Box 4019, Edison, New Jersey 08818-4019.

TABLE OF CONTENTS

626-PA-6006 AC NEUTRAL MONITOR

VOLUME 1

Section			Page
I	GENERAL INFORMATION		
	1.1	Scope	1-1
	1.2	Introduction	1-1
	1.3	Purpose	1-1
	1.4	Equipment Characteristics	1-2
	1.5	Standard Accessories	1-3
	1.6	Optional Accessories	1-3
	1.7	Factory Repair	1-3
II	INSTALLATION AND OPERATION		
	2.1	Installation	2-1
	2.1.1	Load Ratings	2-1
	2.2	Connecting Power Source to Module	2-2
	2.2.1	Connection Procedure	2-2
	2.2.2	Circuit Applications	2-3
	2.2.3	Installation Guidelines	2-5
	2.3	Operating the 6006	2-6
	2.3.1	Operating Controls and Indicators	2-6
	2.3.2	Programming Procedure	2-6
	2.4	Selecting the Factory Preset Program	2-9
	2.5	Description of Data Printouts	2-9
	2.5.1	Overvoltage	2-9
	2.5.2	Voltage Change	2-10
	2.5.3	Voltage Surge	2-10
	2.5.4	Impulses	2-10
	2.6	Printout Modes	2-11
III.	OPERATIONAL TEST		
	3.1	General	3-1
	3.2	System Check	3-1
	3.3	System Check Signal Levels	3-1
	3.3	System Check Signal Tolerances	3-1
APPENDIX A.		Impulse Duration/Direction Option, Option 101	A-1
APPENDIX B.		Impulse Area/Direction Option, Option 102	B-1

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

LIST OF ILLUSTRATIONS

Figure		Page
2-1	Series 626 Controls Used by the 6006 Plug-In. . .	2-6
2-2	Overvoltage Disturbance (6006).	2-11
A-1	Proper Connections of 626-PA-6006 for Use with Current Probe.	A-3
A-2	Impulse Duration Measurement	A-5
B-1	Impulse Strength Measurement	B-3

LIST OF TABLES

Table		Page
1-1	626-PA-6006 Technical Specifications	1-2
2-1	6006 Operating Controls	2-6
A-1	626-PA-6006 Option 101 Technical Specifications.	A-1
B-1	626-PA-6006 Option 102 Technical Specifications.	B-1

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

Manual Effectivity

Instruction Manual TM-110390AU provides operating instructions for 626-PA-6006 plug-ins having differential signal inputs. These units have three circuit voltage input connectors or terminal blocks on the rear panel. Units received after October, 1982 will probably be of the differential input type.

If a 626-PA-6006 has a two-circuit voltage input connector or terminal block, TM-110390 applies.

STATEMENT OF WARRANTY

ALL PRODUCTS OF DRANETZ TECHNOLOGIES, INC. ARE WARRANTED TO THE ORIGINAL PURCHASER AGAINST DEFECTIVE MATERIAL AND WORKMANSHIP FOR A PERIOD OF ONE YEAR FROM THE DATE OF DELIVERY. DRANETZ WILL REPAIR OR REPLACE, AT ITS OPTION, ALL DEFECTIVE EQUIPMENT RETURNED, FREIGHT PREPAID, DURING THE WARRANTY PERIOD, WITHOUT CHARGE FOR REPAIR, PROVIDED THERE IS NO EVIDENCE THAT THE EQUIPMENT HAS BEEN MISHANDLED OR ABUSED.

NOTE

The information in this manual has been reviewed and is believed to be entirely reliable. However, no responsibility is assumed for any inaccuracies. The material in this manual is for information purposes only, and is subject to change without notice.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

VOLUME 1
OPERATOR'S MANUAL

626-PA-6006 AC NEUTRAL MONITOR

SECTION I
GENERAL INFORMATION

1.1 SCOPE

This manual consists of two volumes. Volume 1, the Operator's manual, consists of three sections: I) GENERAL INFORMATION, II) INSTALLATION AND OPERATION, and III) OPERATIONAL TEST. In addition, Appendices A and B cover Options 101 and 102, respectively, for the 6006 plug-in. Volume 2, the Service manual, contains the maintenance instructions (Sections IV thru VII).

1.2 INTRODUCTION

This technical manual provides installation and operating instructions for the 626-PA-6006 AC Neutral Monitor Plug-in, hereinafter referred to as the 6006. The 6006 is designed for installation in the Series 626 Universal Disturbance Analyzer. It is assumed that the reader is familiar with the mainframe information presented in Volume 1 of the Series 626 Mainframe manual.

1.3 PURPOSE

The 6006 monitors activity on power system neutral lines with respect to earth ground. With thresholds programmed by the user, the 6006 stores, analyzes, classifies and prints out quantitive and qualitative disturbance data. Accompanying the data is a printout of time, derived from a highly accurate crystal controlled 24-hour clock in the mainframe. This single channel unit finds application in all distribution systems having a designated neutral conductor and operating below 600V rms.

The 6006 has a single voltage range that extends from 2V rms to 50V rms. It monitors two types of disturbances: power frequency transients and waveform disturbances. Power frequency transients are divided into three display categories: overvoltage, voltage change, and voltage surge. Since voltage on the neutral line is nominally zero with respect to earth ground, lower voltage limits are not used and voltage sag and undervoltage printouts are not generated. Waveform disturbances, identified as "impulses", are sharp deviations of short duration (compared to line frequency) from the normal waveform. The 6006 measures both peak amplitude of impulses and their polarity. When equipped with an option board the 6006 also measures pulse duration and direction of origin or pulse strength and direction of origin.

The threshold value of each type of disturbance, above which detection and printout occur, is operator programmable. Except for an automatic summary printout at the end of each day, disturbance data is normally printed out only when disturbances occur. In an alternate mode, a

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

disturbance data summary printout occurs only at the end of each day. This feature permits long term unattended operation.

The threshold program may be easily altered, using the front panel switches. Cueing indicators adjacent to the programming switches simplify the programming procedure. A back-up program for the plug-in, stored in non-volatile memory at the factory, may always be recalled upon operator demand. Both the program and the disturbance data in the data accumulators may be printed out upon demand.

1.4 EQUIPMENT CHARACTERISTICS

The 6006 is configured as a plug-in module 6.5" high by 1.25" wide by 10" deep. It is designed for installation in any of the five slots of the Series 626 Universal Disturbance Analyzer. Technical specifications of the 6006 are listed in Table 1-1.

Table 1-1. 626-PA-6006 Technical Specifications

Input	2-wire differential Z = 40 Megohms plus 10 pf (each side to ground)
Voltage Range	2-50V rms, 45-65 Hz
User-set Upper Limit Voltage	3-30V rms
Voltage Change Sensitivity (1V increments)	1-9 Volts
Line Voltage Measurement Accuracy	+/-1% of reading, +/-0.2% of F.S. at calibration frequency of 50 or 60 Hz. Additional +/-1% at frequency extremes
Impulse Ranges (Determined by Impulse Threshold Selection)	25-1000V for 25 to 100V thresholds 101-2000V for 101 to 200V thresholds 201-4000V for 201 to 4000V thresholds
Impulse Duration Range	2 mSec to 1 uSec for amplitude information only.
Impulse Threshold	25-4000V in 1 volt increments.
Impulse Amplitude Accuracy	+/-5% of reading +/-1% F.S. for half-sinewave impulses 10 uSec in duration regardless of polarity. Error increases to +/-10% of reading, +/-1/% F.S. at 5 uSec and 50 uSec pulse durations, and is typically -6dB at 2 mSec and 1 uSec pulse durations.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

1.5 STANDARD ACCESSORIES

Model No.	Part No.	Quantity	Description
626-PA-6006-1	TM-110390AU Vol. I	1	Operator's Manual
626-PA-6006-2	TM-110390AU Vol. I	1	Operator's Manual
626-PA-6006-2	110487-G1	1	Input Cable with Tinned Leads

1.6 OPTIONAL ACCESSORIES

Part No.	Quantity	Description
TM-110390AU Vol. 2	1	Service (Maintenance) Manual

1.7 FACTORY REPAIR

When factory repair is required, proceed as follows:

1. Contact the Dranetz Service Corporation (formerly Dranetz Technologies, Inc., Customer Service Department) in order to obtain an Authorization Number for factory repair.

Telephone: (201) 755-7081

TWX: (710) 997-9553

Telex: 499-7808

Cable: DRANETZ

2. Fill out the REPAIR/SERVICE ORDER enclosed in the Series 626 Operating Manual. Ship it along with the malfunctioning equipment to the Dranetz Service Corporation.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

SECTION 2
INSTALLATION AND OPERATION

2.1 INSTALLATION

To install the 6006 in the mainframe, proceed as follows:

CAUTION: Be sure 626 is turned off and that all power connected to all the plug-in modules is turned off.

a. Position the top and bottom front corners of the plug-in module in the upper and lower tracks at the desired slot position at the rear of the mainframe.

b. Carefully slide the module into the mainframe until it is firmly seated.

c. Tighten the top and bottom captive screws to secure the module to the mainframe.

2.1.1 Load Ratings

The Series 626 standard mainframe has an upper limit of the total load rating of the installed modules. The overall mainframe capacity is set at 20 Units, and individual modules have load ratings as follows:

Plug-in	Load Rating
626-PA-6001	2 Units
626-PA-6001 with extra Option Board	3 Units
626-PA-6002	2 Units
626-PA-6003	4 Units
626-PA-6005	2 Units
626-PA-6006	2 Units
626-PA-6007	1 Unit
626-PA-6008	2 Units
626-PA-6009	4 Units
626-PA-6011	1 Unit
626-PA-6012	2 Units
626-PA-6012A	3 Units
626-PA-6013	2 Units
626-PA-6014	1 Unit
626-PA-6015	4 Units
626-PA-6018	4 Units
626-PA-6020	4 Units

NOTE

When selecting modules for installation into any any 626 Mainframe, verify that the load rating sum of the installed modules DOES NOT exceed 20 Units.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

2.2 CONNECTING POWER SOURCE TO MODULE

2.2.1 Connection Procedure

The 6006 is supplied with a barrier type terminal strip under a small cover (626-PA-6006-1) or with a three pin connector (626-PA-6006-2) located at the rear of the module. Proceed as follows:

a. Insert key in FUNCTION key switch on front panel of mainframe and set switch to OFF position.

b. Turn off AC power to the line that is to be monitored.

c. Remove the terminal strip safety cover to expose the connections. Connect the neutral line to the terminal designated "+". Connect the earth ground point used for measurement reference to the terminal designated "-". Connect safety earth ground to terminal marked ⏚. When all connections have been made, be sure to replace the terminal block cover, then reapply AC power.

d. If a voltage input connector is installed on the rear panel of the 6006, the AC source to be monitored should be wired to the cable assembly (DEL #110487-G1) supplied with the module. If the supplied cable is not adequate, the mating connector can be obtained from AMP, INC. The part numbers are as follows:

Part Number	Description
1-480700-0	Connector Housing
1-640720-0	Strain Relief
350690-1	Pin Contacts

Attach wired mating connector to the rear panel connector then reapply AC power.

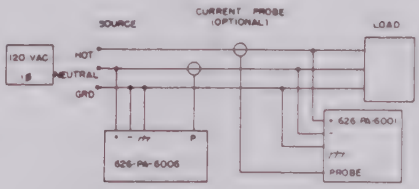
CAUTION

To avoid damaging the equipment, do not apply AC voltage in excess of 600V rms to the 6006.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

2.2.2 Circuit Applications

The 626-PA-6006 is used to monitor Neutral-Ground AC in single or multi-phase systems, usually in combination with the 626-PA-6001 or 626-PA-6003, as illustrated below.



Single Phase AC, with 626-PA-6001

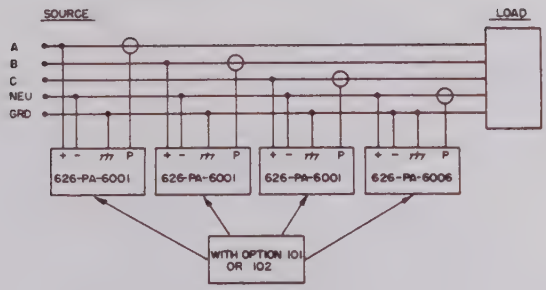
Note

Current probes are included with Option 101 and 102 for 626-PA-6001 Series and 626-PA-6006 Series.

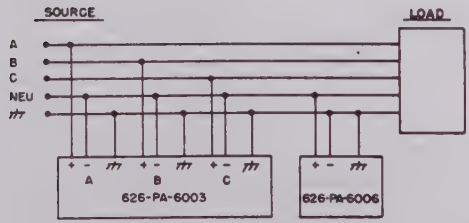
WARNING

Connection should only be performed by qualified personnel. Conductors connecting to measurement points should be approved for the specific use. When connected to branch circuits of 20 amperes or less, minimum flexible cord size is No. 18 (1 mm^2). For branch circuits with higher ampacity, refer to National Electric Code (ANSI CI-1975 Para. 240-4 and Para. 250-95). Special consideration of ground may be required. Refer to Article 250 of above reference if in doubt. Outside U.S.A. consult applicable safety standards.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.



3 Phase Wye, With 626-PA-6001



3 Phase Wye, With 626-PA-6003

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

2.2.3 Installation Guidelines

Proper monitoring and analysis of AC and DC voltage disturbances requires careful attention to the method of connection between the Series 626 Universal Disturbance Analyzer and the monitored circuit. To obtain the most accurate and relevant voltage monitoring data, the following suggested guidelines should be utilized.

1. To minimize spurious Impulse transients and interchannel coupling, always use the Dranetz test cables supplied with the 626. If cables are not supplied, such as with the barrier strip input modules, the test cable should be composed of twisted-pair wires for each input channel.

2. Test cable length should be minimized, preferably less than 9 feet from the Series 626 to the circuit connection point. This will minimize amplitude variation of Impulse transients.

3. If monitoring a power line connected to critical, sensitive load equipment, the test cable should be connected to the power line as close as possible to the load. For three-phase loads, the 626 should be connected in the same way as the load equipment, i.e. Phase to Phase or Phase to Neutral.

4. Use of instrument-grade Potential Transformers for monitoring Impulses on high voltage power lines is not recommended. The limited frequency response of most Potential Transformers may result in substantial variation of Impulse amplitude.

5. The Series 626 is designed to operate from disturbed power lines. Therefore, the 626 power supply may be connected to the same power line that is being monitored. However, the user should be aware that the extensive transient suppression incorporated with the 626 power supply may alter the transient characteristics of the AC power line to which the power supply is connected. If the user wishes to prevent alteration of the transient characteristics of the power line being monitored, the 626 power supply input should be separated from the monitored inputs.

6. The ground terminals of the plug-in modules are connected internally to the safety grounding conductor in the 626 power plug. Be careful not to inadvertently contaminate a "clean" ground with a "dirty" ground.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

2.3 OPERATING THE 6006

2.3.1 Operating Controls and Indicators

The functions of the mainframe operating controls and indicators associated with 6006 operation are described in Table 2-1. Figure 2-1 shows the typical front panel controls associated with a 6006. For a description of controls common to overall Series 626 operation, refer to Volume 1 of the Series 626 Mainframe manual.

2.3.2 Programming Procedure

Assume it is desired to program a high limit of 20V, a voltage sensitivity of 2 volts, and an impulse sensitivity of 75V. Sensitivity sets the deviation from the present value above or below which a detected value produces a recorded disturbance.

Impulse ranges are set up automatically in accordance with pulse sensitivity selected. Thus, selection of an impulse sensitivity of 75V automatically produces an impulse range of 25 to 1000V (See Table 1-1).

Table 2-1. 6006 Operating Controls

Item	Function
HI LIMIT pushbutton	When depressed, enables numeric keyboard to program high limit voltage.
SENS pushbutton	When depressed, enables numeric keyboard to program voltage sensitivity value.
IMP SENS pushbutton	When depressed, enables numeric keyboard to program impulse voltage sensitivity value.
ENTER pushbutton	When depressed, transfers numeric keyboard value into the 6006 memory.
DATA pushbutton	When depressed, produces data summary printout. (Functions in operate mode only.)
PROG pushbutton	When depressed, unit prints time and a summary of the program (threshold settings) in each channel in sequence (1-5). (Functions in operate mode only.)
PRESET pushbutton	With FUNCTION switch set to PROGRAM and a channel switch (1-5) depressed, depressing PRESET switch recalls nonvolatile factory program for that channel.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

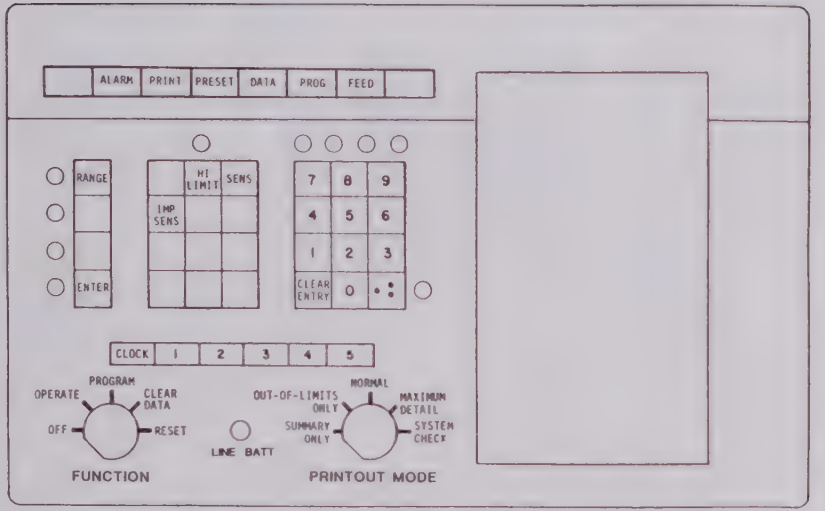


Figure 2-1. Series 626 Controls Used by the 6006 Plug-In

For impulse measurements, the sensitivity corresponds to the absolute threshold, so that for an impulse sensitivity of 75 volts, a disturbance is recorded when impulse amplitude is greater than or equal to 75 volts.

For the example cited, program the 6006 as follows:

a. Set FUNCTION switch to PROGRAM.

b. Depress the channel pushbutton (1-5) that corresponds to the slot position of the plug-in to be programmed. Note that a program summary for that channel is immediately printed.

c. Note that the red cueing lamp above the center bank of pushbuttons lights. This indicates that one of the functions in that pushbutton bank is to be selected. Depress the HI LIMIT pushbutton.

d. Note that two yellow lamps above the numeric keyboard now light. Enter 20 using the keyboard. As each digit is entered, one lamp goes out. If an error is made, depress CLEAR ENTRY and correct the entry.

e. When the high limit value has been programmed, the green lamp next to the ENTER pushbutton lights. Depress this pushbutton to enter the value. The high limit entry (V HIGH LIMIT 20V) will now be echoed back on the printout.

f. When the green ENTER indicator goes out, the red indicator above the center bank of pushbuttons lights again. This indicates that another function may be programmed.

g. Depress the SENS pushbutton. Program the voltage sensitivity value (2) as in step d.

h. When the green ENTER indicator lights, depress the ENTER pushbutton. The programmed voltage sensitivity value will be echoed back on the printout.

i. Repeat steps f, g, and h for the impulse sensitivity (0075), using the IMP SENS pushbutton.

j. When the plug-in program is completed, the user may proceed to program another module (by depressing another channel number) or he may place the instrument on line by setting the FUNCTION switch to OPERATE. While on line, the program in effect may be obtained by simply depressing the PROG pushbutton.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

2.4 SELECTING THE FACTORY PRESET PROGRAM

To select the program stored in hard memory, set the FUNCTION switch to PROGRAM and depress the channel number desired. The last operator-set program will be printed out. Now depress the PRESET pushbutton to recall the factory-set program. Unless specially modified to customer requirements, the factory-set program for the 6006 is as follows:

626*	626A*
IMPULSE SENS @100V	PROGRAM SUMMARY
VOLTAGE SENS @02V	CH 1
V HIGH LIMIT @5V	626-PA-6006
626-PA-6006	V HIGH LIMIT @5V
CH 1	VOLTAGE SENS @02V
PROGRAM SUMMARY	IMPULSE SENS @100V

2.5 DESCRIPTION OF DATA PRINTOUTS

When any of the disturbances described below is detected by the 6006, it is recorded and displayed as illustrated in the following paragraphs.

2.5.1 Overvoltage

An overvoltage condition exists when the monitored power line neutral voltage exceeds the user specified upper limit for more than 2.56 seconds. An overvoltage condition is indicated by a printout such as the following:

```
4 HIGH 12:34:56.78
```

where 4 is the channel number and time is given in hours, minutes and seconds (to .01 sec resolution).

When the line voltage recovers to normal, a printout such as the following occurs:

626	626A
4 NORM 12:36:14.56	35.8 V MAX
35.8 V MAX	4 NORM 12:36:14.56

indicating when normal voltage was restored and the value of the highest voltage reached during the overvoltage interval.

---

*If you are using a Model 626, read (from the bottom up) the "626" printouts in this manual; if using a 625A, read (from the top down) the "626A" printouts instead.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

2.5.2 Voltage Change

A voltage change printout is triggered when the neutral to ground voltage changes more than a preselected amount from the last printed value. The voltage change sensitivity is a user selected integral voltage between 1 and 9 volts. The following example shows several voltage change printouts. The first shows a voltage increase to 15.4V at the time shown; the second shows a decrease to 9.2V.

626	626A
2 INC 01:02:34.58 15.4V	15.4V 2 INC 01:02:34.58
2 DEC 01.01:34.56 9.2V	9.2V 2 DEC 01:01:34.56

2.5.3 Voltage Surge

A Voltage Surge is defined as line voltage which increases through a user-selected upper limit and then returns to an in-tolerance condition in less than 2.56 seconds. When a surge begins, its starting time is printed as follows:

```
3 HIGH  12:34:50.49
```

When the line voltage returns to a normal level following a Surge condition, a message such as the following will be printed:

626	626A
3 NORM 12:34:51.59 35.2 V MAX SURGE 1.10 SEC	SURGE 1.10 SEC 35.2 V MAX 3 NORM 12:34:51.59

In this case, the time at which the voltage returned to normal is shown as well as the maximum voltage reached and the surge duration.

2.5.4 Impulses

"Impulse" disturbances represent any line perturbation which contains frequency components in the 300Hz to 500KHz range. An impulse type disturbance produces a printout such as the following:

626	626A
2 IMP 10:12:13.45 +0139 V PK	+0139 V PK 2 IMP 10:12:13.45

This printout indicates that an impulse which deviated from normal neutral line voltage by +139 volts peak was detected on channel 2 at the time shown. The "+" indicates the impulse was positive with respect to the signal return (-) terminal on the rear panel of the 5006.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

2.6 PRINTOUT MODES

The setting of the PRINTOUT MODE switch on the front panel of the mainframe determines how much detail is printed out. Printout data is reduced as the switch is rotated counterclockwise.

The following example printouts show how various settings of the PRINTOUT MODE switch change the amount of detail in the printed record of a disturbance. It is assumed that the disturbances occurred in Channel 1 and that the limits for Channel 1 were programmed as follows:

V HIGH LIMIT 20Vrms
V SENSITIVITY 2Vrms

The example printouts are referenced to figure 2-2 which illustrates an overvoltage disturbance.

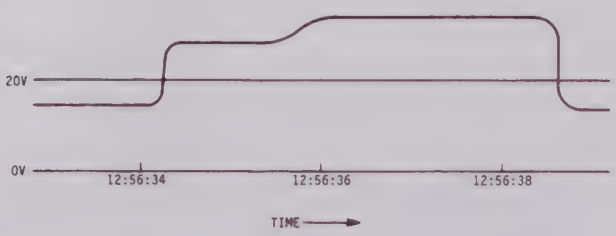


Figure 2-2. Overvoltage Disturbance (6006)

Disturbances which occur while the PRINTOUT MODE switch is in the SUMMARY ONLY position do not generate individual printouts but they are stored in the daily accumulator and are automatically printed each day at midnight (worst case event and number of occurrences in each category). This printout may also be triggered manually by depressing the DATA button.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

The first printout group generated below illustrates overvoltage (fig. 2-2) in the NORMAL mode. The second group shows overvoltage in the OUT-OF-LIMITS mode.

626	626A
1 NORM 12:56:38.51 34.1 V MAX	1 HIGH 12:56:34.21
1 HIGH 12:56:34.21	24.2 V 1 INC 12:56:34.21
	26.3 V 1 INC 12:56:34.22
1 NORM 12:56:38.51 34.1 V MAX	28.3 V 1 INC 12:56:35.40
1 DEC 12:56:38.50 25.2 V	30.3 V 1 INC 12:56:35.62
1 INC 12:56:35.78 32.3 V	32.3 V 1 INC 12:56:35.78
1 INC 12:56:35.62 30.3 V	25.2 V 1 DEC 12:56:38.50
1 INC 12:56:35.40 28.3 V	34.1 V MAX 1 NORM 12:56:38.51
1 INC 12:56:34.22 26.3 V	
1 INC 12:56:34.21 24.2 V	1 HIGH 12:56:34.21
1 HIGH 12:56:34.21	34.1 V MAX 1 NORM 12:56:38.51

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

The following printout illustrates overvoltage (fig. 2-2) in the MAXIMUM DETAIL mode.

626	626A
1 DEC 12:56:38.61	16.1 V
14.8 V	1 INC 12:56:34.20
1 DEC 12:56:38.53	1 HIGH 12:56:34.21
16.8 V	24.2 V
1 DEC 12:56:38.51	1 INC 12:56:34.21
19.0 V	26.3 V
1 NORM 12:56:38.51	1 INC 12:56:34.22
34.1 V MAX	28.3 V
1 DEC 12:56:38.50	1 INC 12:56:35.40
25.2 V	30.3 V
1 INC 12:56:35.78	1 INC 12:56:35.62
32.3 V	32.3 V
1 INC 12:56:35.62	1 INC 12:56:35.78
30.3 V	25.2 V
1 INC 12:56:35.40	1 DEC 12:56:38.50
28.3 V	34.1 V MAX
1 INC 12:56:34.22	1 NORM 12:56:38.51
26.3 V	19.0 V
1 INC 12:56:34.21	1 DEC 12:56:38.51
24.2 V	16.8 V
1 HIGH 12:56:34.21	1 DEC 12:56:38.53
1 INC 12:56:34.20	14.8 V
16.1 V	1 DEC 12:56: 38.61

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

SECTION III
OPERATIONAL TEST

3.1 GENERAL

This section provides information for performing an operational test to verify that the 6006 plug-in is operating properly.

3.2 SYSTEM CHECK

When the Printout Mode Switch is set to SYSTEM CHECK, a source of precise signals is applied to the front end circuitry of the 6006. Any inputs that are connected at this time will be automatically disconnected for the system check period. These signals fully verify the functionality of the module. A typical system check printout, as well as the system signals and the allowable tolerance levels, are shown below.

626

```
******************

PRESENT V 030.0 V
IMP    + 0160 V PK
   6006-PA-6006
        CH 3

TIME = 00:14.29
***SYSTEM CHECK***
```

626A

```
***SYSTEM CHECK***
TIME = 00:14.29

        CH 3
   626-PA-6006
IMP    + 0160 V PK
PRESENT V 030.0 V

******************
```

3.3 SYSTEM CHECK SIGNAL LEVELS

Impulse: +160V pk
Voltage: 30.0 Vrms

3.4 SYSTEM CHECK SIGNAL TOLERANCES

Impulse: +134 to +186V pk
Voltage: 29.6 to 30.4V rms

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

APPENDIX A. IMPULSE DURATION DIRECTION OPTION, OPTION 101 FOR 626-PA-6006 PLUG-IN NOT COMPATIBLE WITH OPTION 102

A.1 INTRODUCTION

The following paragraphs describe the differences between the 6006 with Option 101 and the standard 6006. The information that follows supersedes that found in previous paragraphs of this manual unless otherwise stated.

A.2 PURPOSE

Option 101 has no effect on the neutral to ground voltage measurements of the 6006 described in paragraph 1.3. It also does not affect the measurement of impulse polarity and peak voltage. Option 101 is designed to provide information on impulse duration. In addition, if the TR-2018 current probe is used, direction of origin will be determined for impulses having a current of 3 Amps or greater at the time of measurement.

A.3 EQUIPMENT CHARACTERISTICS

Technical specifications for Option 101 are listed in Table A-1. All specifications for the 6006 listed in Table 1-1 still apply.

Table A-1. 626-PA-6006 Option 101 Technical Specifications

IMPULSE DURATION

Range: 1 uSec to 1023 uSec

Accuracy: +/-6% of reading +/-0.3% F.S. for 1/2 sinewave pulses up to 100 uSec duration greater than 100 Vpk. Typically - 10% at 200 uSec, -20% at 400 uSec, -50% at 1000 uSec.

Timing Reference Points: Start at 25V - stop at 30% of Vpk.

Minimum Impulse Voltage: 50 Vpk

IMPULSE DIRECTION OF ORIGIN

Minimum Impulse Current: 3 Amps for 0.1 uSec before and after measurement.

Minimum Impulse Voltage: 50 Vpk

Maximum Line Frequency Current: 250 A rms

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986, 1987 BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

A.4 INSTALLATION IN MAINFRAME

The module is installed in the mainframe in the same manner as the standard 6006 described in paragraph 2.1.

A.5 CONNECTIONS TO THE MODULE

Connecting the 6006 to the line to be monitored is the same as described in paragraph 2.2. If impulse direction information is required, the current probe must be connected in the following manner.

a.) Turn off AC power to the line that is to be monitored.

b.) Attach the current probe connector to its mating connector on the rear panel of the 6006.

c.) Install current probe on the line which is connected to the "+" voltage terminal of the corresponding channel. Be sure that the arrow on the current probe points from the source to the load. (See figure A-1.)

d.) Reapply AC power.

A.6 OPERATING THE 6006 WITH OPTION 101

Operation of the 6006 with Option 101 requires no additional programming steps. Programming is the same as described in paragraphs 2.3 and 2.4.

A.7 DESCRIPTION OF DATA PRINTOUTS

The only printouts affected by the addition of Option 101 are those for module identification and impulse data.

When a Program Summary key (designated "PROG") is depressed, the module will be identified as a 626-PA-6006R1 as in the following example.

626	626A
IMPULSE SENS Ø1ØØV	PROGRAM SUMMARY
VOLTAGE SENS ØØ2V	11/17/83 15:20:26
V HIGH LIMIT 125V	CH 1
626-PA-5006R1	626-PA-600ØR1
CH1	V HIGH LIMIT 125V
11/17/83 15:20:26	VOLTAGE SENS ØØ2V
PROGRAM SUMMARY	IMPULSE SENS Ø1ØØV

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986, 1987
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

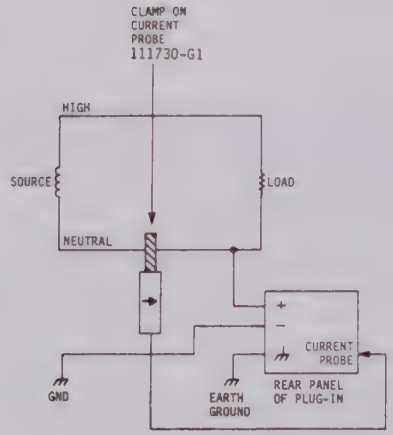


Figure A-1. Proper Connections of 626-PA-6006 for Use with Current Probe

COPYRIGHT © 1981,1982,1983,1984,1985,1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

IMPULSE

A minimum impulse voltage of 50 Vpk is required to obtain duration data. For information on the direction of origin, a minimum impulse voltage of 50 Vpk and a minimum impulse current of 3 Amps is required.

If the current probe is not used or if it is used, but the impulse current is less than 3 Amps at the time of measurement, the printout will take on the following form:

	626	626A	
↑	4 IMP 12:34:56.88 +2057V, 089uS	+2057V, 089us 4 IMP 12:34:56.88	↓

This printout indicates that an impulse which deviated from the normal line voltage for 89 microseconds with a peak voltage of 2057 volts was detected on channel 4 at the time shown. The "+" preceding the impulse voltage indicates that the impulse was positive with respect to the ground terminal on the 6006 rear panel.

IMPULSE WITH DIRECTION

When the current probe is used and the impulse current is greater than 3 Amp at the time of measurement, the printout will take the form of the following:

	626	626A	
↑	4 IMP 12:34:57.00 +2057V, LOAD, 089uS	+2057V, LOAD, 089us 4 IMP 12:34:57.00	↓

This printout indicates that an impulse originating from the load, of +2057 volts peak and 89 microseconds in duration occurred at the time shown. If the direction had been from the source, SRCE would be printed in place of LOAD in the example. Figure A-2 illustrates an impulse duration measurement.

A.8 PRINTOUT MODES

Printout modes and calibration signals remain the same as in the standard 6006 described in paragraph 2.6.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986, 1987
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

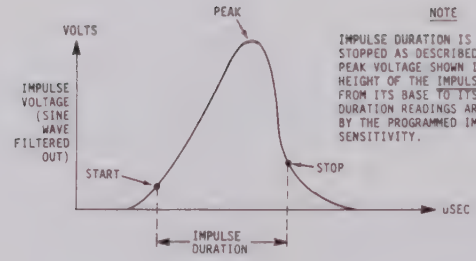

PEAK
VOLTS
IMPULSE VOLTAGE (SINE WAVE FILTERED OUT)
START
STOP
uSEC
IMPULSE DURATION
NOTE
IMPULSE DURATION IS STARTED AND STOPPED AS DESCRIBED IN TABLE A-1. PEAK VOLTAGE SHOWN IS STRICTLY THE HEIGHT OF THE IMPULSE ALONE, FROM ITS BASE TO ITS PEAK. DURATION READINGS ARE UNAFFECTED BY THE PROGRAMMED IMPULSE SENSITIVITY.

Figure A-2. Impulse Duration Measurement

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

APPENDIX B. IMPULSE AREA/DIRECTION OPTION, OPTION 102 FOR 626-PA-6006 SERIES (NOT COMPATIBLE WITH OPTION 101)

B.1 INTRODUCTION

The following paragraphs describe the differences between the 6006 with Option 102 and the standard 6006.

NOTE

The following data supersedes that found in Sections 1 through 3 unless otherwise stated.

B.2 PURPOSE

Option 102 has no effect on the neutral to ground voltage measurements of the 6006 described in paragraph 1.3. It also does not affect the measurement of impulse polarity and peak voltage. Option 102 is designed to provide information on impulse area. In addition, if the current probe is used, direction of origin will be determined for impulses having a current of 3 Amps or greater at the time of measurement.

B.3 EQUIPMENT CHARACTERISTICS

Technical specifications for Option 102 are listed in Table B-1. All specifications for the 6006, listed in Table 1-1, still apply.

Table B-1. 626-PA-6006 Option 102 Technical Specifications

IMPULSE AREA

Range: 0.0002 to 0.2046 V-Sec

Accuracy: ±10% of reading, ±0.1% of F.S. for 1/2 sinewave pulses up to 100 uSec duration greater than 100 Vpk. Typically -20% at 200 uSec, -50% at 500 uSec.

Timing Reference Points: Start at 25V - stop at 30% of Vpk.

Minimum Impulse Voltage: 50 Vpk.

IMPULSE DIRECTION OF ORIGIN

Minimum Impulse Current: 3 Amps for 0.1 uSec before and after measurement.

Minimum Impulse Voltage: 50 Vpk

Maximum Line Frequency Current: 250 A rms

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986, 1987
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

B.4 INSTALLATION IN MAINFRAME

The module is installed in the mainframe in the same manner as the standard 6006 described in paragraph 2.1.

B.5 CONNECTIONS TO THE MODULE

Connecting the 6006 to the line to be monitored is the same as described in paragraph 2.2. If impulse direction information is requred, the current probe must be connected as described in paragraph A.5.

B.6 OPERATING THE 6006 WITH OPTION 102

Operation of the 6006 with Option 102 requires no additional programming steps. Programming is the same as described in paragraph 2.3.2.

B.7 DESCRIPTION OF DATA PRINTOUTS

The only printouts affected by the addition of Option 102 are those for module identification and impulse data. When the Program Summary key (designated "PROG") is depressed, the module will be identified as a 626-PA-6006R2 as in the following example.

626	626A
IMPULSE SENS 0100V	PROGRAM SUMMARY
VOLTAGE SENS 002V	11/17/83 15:30:00
V HIGH LIMIT 025V	CH1
626-PA-6006R2	626-PA-6006R2
CH1	V HIGH LIMIT 25V
11/17/83 15:30:00	VOLTAGE SENS 002V
PROGRAM SUMMARY	IMPULSE SENS

IMPULSE

A minimum impulse voltage of 50 Vpk is required to obtain area data. For information on the direction of origin, a minimum impulse voltage of 50 Vpk and a minimum impulse current of 3 Amps is required.

If the current probe is not used, or if it is used but the impulse current is less than 3 Amps at the time of measurement, the printout will take on the following form:

626	626A
4 IMP 12:34:56.88	+2057V
0.0156 V-SEC	0.0156 V-SEC
+2057V	4 IMP 12:34:56.88

This printout indicates that an impulse which deviated from the normal line voltage with an area of 0.0156V-Sec and a peak voltage of 2057 volts was detected on channel 4 at the time shown. The "+" preceding the impulse voltage indicates that the impulse was positive with respect to the ground terminal on the 6006 rear panel.

 COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986, 1987 BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

IMPULSE WITH DIRECTION

When the current probe is used and the impulse current is greater than 1 Amps at the time of measurement, the printout will take the following form:

	626	626A	
↑	4 IMP 12:34:57.00 0.0156 V-SEC +2057V, LOAD	+2057V, LOAD 0.0156 V-SEC 4 IMP 12:34:57.00	↓

This printout indicates that an impulse originating from the load, of +2057 volts peak and an area of 0.0156V-Sec, occurred at the time shown. If the direction had been from the source, SRCE would be printed in place of LOAD in the example.

Figure B-1 illustrates an impulse strength (area) measurement.

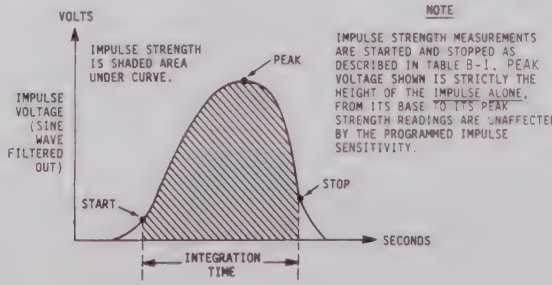

VOLTS
IMPULSE STRENGTH IS SHADED AREA UNDER CURVE.
PEAK
IMPULSE VOLTAGE (SINE WAVE FILTERED OUT)
START
STOP
SECONDS
INTEGRATION TIME
NOTE
IMPULSE STRENGTH MEASUREMENTS ARE STARTED AND STOPPED AS DESCRIBED IN TABLE B-1. PEAK VOLTAGE SHOWN IS STRICTLY THE HEIGHT OF THE IMPULSE ALONE, FROM ITS BASE TO ITS PEAK. STRENGTH READINGS ARE UNAFFECTED BY THE PROGRAMMED IMPULSE SENSITIVITY.

Figure B-1. Impulse Stregth Measurement

B.8 PRINTOUT MODES

Printout modes and calibration signals remain the same as in the standard 6006 described in 2.6.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986, 1987
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

WARNING

Because of possible shock or fire hazards, connection of this instrument should be performed in compliance with National Electrical Code (ANSI C1) and/or any other requirements which may be applicable to the user.

Installation, operation, and maintenance should be performed only by qualified personnel.

TM-110280-1U

VOLUME 1

OPERATOR'S MANUAL

626-PA-6007

EVENT MONITOR

Note Refer to Volume 2 (Service Manual) of TM-110280-1U for maintenance data.

1 May 1984
(Rev. 1 September 1985)
(Rev. 1 May 1986)

© COPYRIGHT 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC., EDISON, NEW JERSEY.
ALL RIGHTS RESERVED.

DRANETZ
DRANETZ TECHNOLOGIES, INCORPORATED
1000 New Durham Rd., PO Box 4019, Edison, NJ 08818-4019

NOTICE CONCERNING DRANETZ' PROPRIETARY RIGHTS

This publication contains information proprietary to Dranetz Technologies, Inc. By accepting and using this manual, the user agrees that the information contained herein will be used solely for the purpose of repairing or operating equipment of Dranetz Technologies, Inc. These manuals are to be returned to Dranetz Technologies, Inc. when no longer required by the user, or when there is a change in ownership of the equipment.

These publications are protected under the Copyright laws of the United States Title 17 et seq. No part of this publication may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language or computer language, in any form, by any means, electronic, mechanical, magnetic, optical, chemical, manual, or otherwise, without the expressed written consent of Dranetz Technologies, Incorporated, 1000 New Durham Road, PO Box 4019, Edison, New Jersey 08818-4019.

TABLE OF CONTENTS

626-PA-6007 EVENT MONITOR

VOLUME 1

Section			Page
I	GENERAL INFORMATION		
	1.1	Scope	1-1
	1.2	Introduction	1-1
	1.3	Purpose	1-1
	1.4	Equipment Characteristics	1-1
	1.5	Standard Accessories	1-2
	1.6	Optional Accessories	1-2
	1.7	Factory Repair	1-2
II	INSTALLATION AND OPERATION		
	2.1	Installation	2-1
	2.1.1	Load Ratings	2-1
	2.2	Connecting Input Channels	2-2
	2.2.1	Connection Procedure	2-2
	2.2.2	Circuit Applications	2-2
	2.3	Operating the 6007	2-3
	2.3.1	Operational Description	2-3
	2.3.2	Operating Controls and Indicators	2-4
	2.3.3	Programming Procedure	2-6
	2.4	Selecting the Factory/Option 101 Preset Program	2-9
	2.5	Description of Data Printouts	2-10
	2.6	Assembling Cables for 626-PA-6007	2-12
III.	OPERATIONAL TEST		
	3.1	General	3-1
	3.2	System Check	3-1

COPYRIGHT © 1981,1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

LIST OF ILLUSTRATIONS

Figure		Page
2-1	Series 626 Controls Used by the 6007 Plug-In	2-5
2-2A	Model 626 Sample Programming Printout	2-7
2-2B	Model 626A Sample Programming Printout. . . .	2-8

LIST OF TABLES

Table		Page
1-1	626-PA-6007 Technical Specifications.	1-2
2-1	6007 Operating Controls	2-6

COPYRIGHT © 1981,1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

STATEMENT OF WARRANTY

ALL PRODUCTS OF DRANETZ TECHNOLOGIES, INC. ARE WARRANTED TO THE ORIGINAL PURCHASER AGAINST DEFECTIVE MATERIAL AND WORKMANSHIP FOR A PERIOD OF ONE YEAR FROM THE DATE OF DELIVERY. DRANETZ WILL REPAIR OR REPLACE, AT ITS OPTION, ALL DEFECTIVE EQUIPMENT RETURNED, FREIGHT PREPAID, DURING THE WARRANTY PERIOD, WITHOUT CHARGE FOR REPAIR, PROVIDED THERE IS NO EVIDENCE THAT THE EQUIPMENT HAS BEEN MIS-HANDLED OR ABUSED.

NOTE

The information in this manual has been reviewed and is believed to be entirely reliable. However, no responsibility is assumed for any inaccuracies. The material in this manual is for information purposes only, and is subject to change without notice.

VOLUME 1
OPERATOR'S MANUAL

626-PA-6007 EVENT MONITOR

SECTION I
GENERAL INFORMATION

1.1 SCOPE

This manual consists of two volumes. Volume 1, the Operator's manual, consists of three sections: I) GENERAL INFORMATION, II) INSTALLATION AND OPERATION, and III) OPERATIONAL TEST. Volume 2, the Service manual, contains the maintenance instructions (Sections IV thru VII).

1.2 INTRODUCTION

This manual provides operating instructions for the 626-PA-6007 Event Monitor Plug-in, hereinafter referred to as the 6007. The 6007 is designed for installation in the Series 626 Universal Disturbance Analyzer. It is assumed that the reader is familiar with the mainframe information presented in Volume 1 of the Series 626 Mainframe manual.

1.3 PURPOSE

The 6007 monitors the state of up to 8 inputs. It senses, identifies and records, in a convenient alphanumeric printout, rapid state changes of such inputs as electromechanical or solid-state relays with a response time of 1 millisecond. The 6007 provides highly accurate and reliable time sequence information, even from extremely noisy sources.

1.4 EQUIPMENT CHARACTERISTICS

The 6007 is configured as a plug-in module 6.5" high by 1.25" wide by 10" deep. It is designed for installation in any of the five slots of the Series 626 Universal Disturbance Analyzer. Technical specifications of the 6007 are listed in Table 1-1.

Table 1-1. 626-PA-6007 Technical Specifications

No. of Channels	8
Input	2 wire differential Z_{in} = 1 Megohm min (each side to ground)
Normal differential input for "high" input state	5-25 VDC
Common mode voltage	±200V DC max with respect to earth ground
Min. Validation Time	5 mSec, 10 mSec, 20 mSec, or 320 mSec (programmable)

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

1.5 STANDARD ACCESSORIES

Part No	Quantity	Description
TM-110280-1U, Vol. 1	1	Operator's Manual
AMP 1-350352-9	8	Pin Housing Connectors
AMP 640545-1	24	Pin Contacts
110289	1	Instruction Decal

1.6 OPTIONAL ACCESSORIES

Part No	Quantity	Description
TM-110280-1U, Vol. 2	1	Service (Maintenance) Manual

1.7 FACTORY REPAIR

When factory repair is required, proceed as follows:

1. Contact the Dranetz Service Corporation (formerly Dranetz Technologies, Inc., Customer Service Department) in order to obtain an Authorization Number for factory repair.

   Telephone No: (201) 775-7081

   TWX: (710) 997-9553

   Telex: 499-7808

   Cable: DRANETZ

2. Fill out the REPAIR/SERVICE ORDER form enclosed in the Series 626 Operating manual. Ship it along with the malfunctioning equipment to the Dranetz Service Corporation.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

SECTION II
INSTALLATION AND OPERATION

2.1 INSTALLATION

To install the 6007 in the mainframe, proceed as follows:

CAUTION: Be sure that the 626 is turned off and that all power connected to all the plug-in modules is turned off.

a. Position the top and bottom front corners of the plug-in module in the upper and lower tracks at the desired slot position at the rear of the mainframe.

b. Carefully slide the module into the mainframe until it is firmly seated.

c. Tighten the top and bottom captive screws to secure the module to the mainframe.

2.1.1 Load Ratings

The Series 626 standard Mainframe has an upper limit of the total load rating of the installed modules. The overall mainframe capacity is set at 20 Units. The individual modules have load ratings as follows:

Plug-In	Load Rating
626-PA-6001	2 Units
626-PA-6001 With Extra Option Board	3 Units
626-PA-6002	2 Units
626-PA-6003	4 Units
626-PA-6005	2 Units
626-PA-6006	2 Units
626-PA-6007	1 Unit
626-PA-6008	2 Units
626-PA-6009	4 Units
626-PA-6011	1 Unit
626-PA-6012	2 Units
626-PA-6012A	3 Units
626-PA-6013	2 Units
626-PA-6014	1 Unit
626-PA-6015	4 Units
626-PA-6018	4 Units
626-PA-6020	4 Units

NOTE

When selecting modules for installation into any Series 626 Mainframe, verify that the sum of the load ratings of the installed modules DOES NOT exceed 20 Units.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

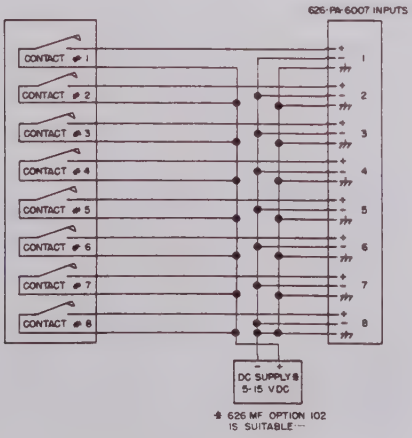
2.2 CONNECTING INPUT CHANNELS

2.2.1 Connection Procedure

The 6007 is equipped with eight 3-pin connectors installed at the rear of the module. The input leads must be wired to the mating connectors supplied with the module, observing the polarity as marked on the rear panel. Attach each wired mating connector to the corresponding (1-8) rear panel connector.

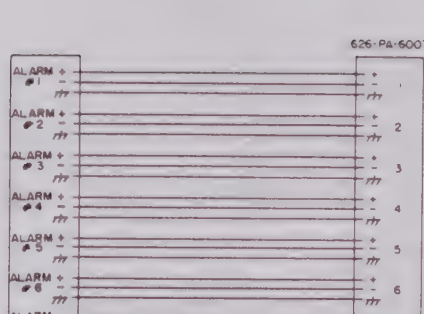
CAUTION: To avoid damaging the equipment, do not apply DC voltages in excess of 200V to the 6007.

2.2.2 Circuit Applications



Connection to Relay Contacts (Separate Contact Supply Required)

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.



Connection to Backplane Alarm Signals
(No Separate Contact Supply Required)

2.3 OPERATING THE 6007

2.3.1 Operational Description

The 6007 records and prints out any change of state of any of its eight inputs. Inputs can be programmed to be "normally closed" (or "high" or "on") or "normally open" (or "low or "off"), in accordance with the application. Minimum validation time is also program selectable to 5 mSec, 10 mSec, 20 mSec or 320 mSec. Both input state and validation parameters are stored in CMOS Random Access Memory so they are maintained when the 626 is turned off.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

When any input changes state, the change data and alarm/normal status of all the inputs are stored. Depending on the printout mode selected, the channel number, input number, alarm/normal status and time of change are printed out. The number of transitions to the alarm state is also stored and printed out during the data summary (along with present state). If a memory overflow occurs, only the transition count is updated. The transition count is stored in the short term accumulator and is printed out when the overflow condition is cleared.

There are three input terminals: +, -, and GND. Since the maximum common mode voltage is +200V DC, maximum inputs from ground are as follows:

positive input = 200V DC, negative input = 197V DC; or
positive input = -197V DC, negative input = -200V DC

The inputs actually change state as follows:

ON = 2.30V DC max
OFF = 1.80V DC min
Hysteresis = 0.10V DC min

2.3.2 Operating Controls and Indicators

The functions of the mainframe operating controls and indicators associated with 6007 operation are described in Table 2-1. Figure 2-1 shows the typical front panel controls used by the 6007. For a description of controls common to overall Series 626 operation, refer to Volume 1 of the Mainframe manual.

Table 2-1. 6007 Operating Controls

Item	Function
F SENS pushbutton	Used in interactive program to change minimum validation time.
SENS pushbutton	Used in interactive program to change polarity of input state(s).
DATA pushbutton	When depressed, produces data summary printout.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

Figure 2-1. Series 626 Controls Used by the 6007 Plug-In

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

2.3.3 Programming Procedure

Assume it is desired to program the minimum validation time of the eight input channels of a 6007 to 10 mSec and the polarities (or states) of the eight inputs as follows:

Input Channel	1	2	3	4	5	6	7	8
Polarity	1	1	0	0	0	0	0	1

where 1 represents N/C or on and 0 is N/O or off

a. Set the FUNCTION switch to PROGRAM and depress the pushbutton (1-5) that corresponds to the slot position of the 6007 plug-in to be programmed. As shown in the sample printout of figure 2-2, note that a program summary is printed, followed by prompt message #1. In the summary, minimum validation time is shown as 5 mSec and the polarity of each channel is shown as 0. Prompt message #1 permits the operator to change any or all polarities or the minimum validation time.

b. To reprogram polarity, respond to prompt message #1 by pressing the SENS pushbutton. This causes prompt message #2 to be generated. Now press 1 1 0 0 0 0 0 1 to update the polarities of the eight inputs.

c. Note that a new summary is now generated, followed by prompt message #1. Polarity is updated, but minimum validation time has not changed.

d. To reprogram minimum validation time, press F SENS. Note that prompt message #3 is printed. To change the minimum time to 10 mSec, press "2". At this time, another summary is printed, indicating that both polarity and minimum time have been corrected. Another prompt message #1 is also generated, enabling further changes to be made, if so desired.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

```
TO CHANGE POLARITY
PRESS: 'SENS'
TO CHANGE MIN TIME
PRESS: 'F SENS'

P 1 1 0 0 0 0 0 1
# 1 2 3 4 5 6 7 8

MIN TIME=010 MSEC

     626-PA-6007
4 FOR 320 MSEC
3 FOR 20 MSEC
2 FOR 10 MSEC
1 FOR 5 MSEC
PRESS

TO CHANGE POLARITY
PRESS: 'SENS'
TO CHANGE MIN TIME
PRESS: 'F SENS'

P 1 1 0 0 0 0 0 1
# 1 2 3 4 5 6 7 8

MIN TIME=005 MSEC

    626-PA-6007
0 FOR N/O OR OFF
1 FOR N/C OR ON
ENTER 8 DIGITS

TO CHANGE POLARITY
PRESS: 'SENS'
TO CHANGE MIN TIME
PRESS: 'F SENS'

P 0 0 0 0 0 0 0 0
# 1 2 3 4 5 6 7 8

MIN TIME=005 MSEC

     626-PA-6007
       CH 2
PROGRAM SUMMARY

  PROGRAM MODE
```

Prompt message #1

Program summary #3

Prompt message #3

Prompt message #1

Program summary #2

Prompt message #2

Prompt message #1

Program summary #1

Figure 2-2A. Model 626* Sample Programming Printout

---

*If you are using a Model 626, read (from the bottom up) the "626" printouts in this manual; if using a 626A, read (from the top down) the "626A" printouts instead.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

```
 PROGRAM MODE

PROGRAM SUMMARY
    CH 2
   626-PA-6007

MIN TIME=0005 MSEC

#  1  2  3  4  5  6  7  8
P  0  0  0  0  0  0  0  0

PRESS: 'F SENS'
TO CHANGE MIN TIME
PRESS: 'SENS'
TO CHANGE POLARITY

ENTER 8 DIGITS
1 FOR N/C OR ON
0 FOR N/O OR OFF
   626-PA-6007

MIN TIME=005 MSEC

#  1  2  3  4  5  6  7  8
P  1  1  0  0  0  0  0  1

PRESS: 'F SENS'
TO CHANGE MIN TIME
PRESS 'SENS'
TO CHANGE POLARITY

PRESS
1 FOR 5 MSEC
2 FOR 10 MSEC
3 FOR 20 MSEC
4 FOR 320 MSEC
  626-PA-6007

MIN TIME=010 MSEC

#  1  2  3  4  5  6  7  8
P  1  1  0  0  0  0  0  1

PRESS: 'F SENS'
TO CHANGE MIN TIME
PRESS: 'SENS'
TO CHANGE POLARITY
```

Program Summary #1

Prompt Message #1

Prompt Message #2

Prompt Summary #2

Prompt Message #1

Prompt Message #3

Program Summary #3

Prompt Message #1

Figure 2-2B. Model 626A Sample Programming Printout

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

2.4 SELECTING THE FACTORY/OPTION .01 PRESET PROGRAM

NOTE: Custon Preset Option .01 allows the user to choose his/her own program for the PRESET function.

To select the program stored in non-volatile memory, set the FUNCTION switch to PROGRAM and depress the channel number desired. The last operator-set program will be printed out. Now depress the PRESET pushbutton to recall the factory-set program. Unless specially modified to customer requirements, the factory-set program for the 6007 is as follows:

626	626A
TO CHANGE POLARITY PRESS: 'SENS' TO CHANGE MIN TIME PRESS: 'F SENS'	PROGRAM MODE PROGRAM SUMMARY CH 4 626-PA-6007
P 0 0 0 0 0 0 0 0 # 1 2 3 4 5 6 7 8	MIN TIME=020 MSEC
MIN TIME=005 MSEC	# 1 2 3 4 5 6 7 8 P 1 0 1 1 0 1 1 0
626-PA-6007	PRESS: 'F SENS' TO CHANGE MIN TIME PRESS: 'SENS' TO CHANGE POLARITY
TO CHANGE POLARITY PRESS: 'SENS' TO CHANGE MIN TIME PRESS: 'F SENS'	626-PA-6007
P 1 0 1 1 0 1 1 0 # 1 2 3 4 5 6 7 8	MIN TIME=005 MSEC
MIN TIME=020 MSEC	# 1 2 3 4 5 6 7 8 P 0 0 0 0 0 0 0 0
626-PA-6007 CH 4 PROGRAM SUMMARY	PRESS: 'F SENS' TO CHANGE MIN TIME PRESS: 'SENS' TO CHANGE POLARITY
PROGRAM MODE	

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

2.5 DESCRIPTION OF DATA PRINTOUTS

With the FUNCTION switch set to OPERATE, a change of state detected in any of the eight inputs to the 6007 produces a printout. A sample appears below:

626				626A			
2	#4	N	19:42:59.47	2	#3	A	19:42:49.56
2	#4	A	19:42:59.42	2	#3	N	19:42:53.28
2	#3	N	19:42:53.28	2	#4	A	19:42:59.42
2	#3	A	19:42:49.56	2	#4	N	19:42:59.47

Each line defines the channel number (2, in this case), the input number (3 or 4), the state of that input and the time of the change.

If the change state activity increases to such a rate that a memory overflow condition occurs, the 6007 initiates a summary mode printout when the overflow interval ends. This printout indicates, for the example below, that 44 alarm "hits" were detected in input No. 8 during the overflow period. Note that for this summary, only those inputs that change are printed.

626	626A
#8 0044 ALARM HIT	SUMMARY MODE
626-PA-6007	CH 2
CH 2	626-PA-6007
SUMMARY MODE	#8 0044 ALARM HIT

If the DATA pushbutton is depressed, a data summary is printed. For each input channel, the data summary indicates the number of transitions to the alarm state as well as the present state.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

626

```
#8   A   0015   ALR   HIT
#7   N   0003   ALR   HIT
#6   N   0000   ALR   HIT
#5   N   0003   ALR   HIT
#4   N   0007   ALR   HIT
#3   N   0002   ALR   HIT
#2   A   0004   ALR   HIT
#1   A   0006   ALR   HIT

      626-PA-6007
          CH2

   10/17/83   19:40:07
      DATA SUMMARY
```

626A

```
      DATA SUMMARY
10/17/83   19:40:07

          CH2
      626-PA-6007

#1   A   0006   ALR   HIT
#2   A   0004   ALR   HIT
#3   N   0002   ALR   HIT
#4   N   0007   ALR   HIT
#5   N   0003   ALR   HIT
#6   N   0000   ALR   HIT
#7   N   0003   ALR   HIT
#8   A   0015   ALR   HIT
```

To obtain a program summary of the plug-ins in the Series 626, set the FUNCTION switch to OPERATE and depress the PROG pushbutton. The following program summary was obtained with a single 6007 module installed in slot position 2.

626

```
P  1  1  0  0  0  0  0  1
#  1  2  3  4  5  6  7  8

MIN  TIME=010 MSEC

      626-PA-6007
          CH 2

   10/17/83   19:40:40

      PROGRAM SUMMARY
```

626A

```
      PROGRAM SUMMARY

10/17/83    19:40:40

          CH 2
      626-PA-6007

MIN  TIME=010 MSEC

#  1  2  3  4  5  6  7  8
P  1  1  0  0  0  0  0  1
```

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

2.6 ASSEMBLING CABLES FOR 626-PA-6007

To attach the wires to the pins provided in the accessory bag for use with the 626-PA-6007, AMP tool #90325-1 is recommended. If this tool is not available, the following procedure may be used instead.

1) Take the three conductor twisted pair of red, green and black 24 AWG wires and untwist the 2 inches at one end.

2) Strip the insulation back 1/2" ±1/16" and tin the wires.

3) Insert the wire into the pin until 1/8" of insulation is touching the pin (so edge of insulation is even with the first (outer) set of tabs.) Bend these tabs tightly over the insulated wire, one at a time, with a needle-nose pliers.

4) Bend the inner tabs tightly over the stripped wire, one at a time, with a needle-nose pliers.

5) Apply a soldering iron to the inner tab. After heating for several seconds, apply a small amount of rosin core solder to the point of contact. Let flow for several seconds and remove soldering iron. Do not heat too long or the insulation may melt.

6) Repeat for the remaining 2 wires in the group.

7) When the pin has cooled, insert the pins into the connectors provided as follows, until a click is felt.

a. Red wire into hole marked #1.
b. Black wire into hole marked #2.
c. Green wire into hole marked #3.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

SECTION III
OPERATIONAL TEST

3.1 GENERAL

This section provides information for performing an operational test to verify that the 6007 plug-in is operating properly.

3.2 SYSTEM CHECK

When the PRINTOUT MODE switch is set to SYSTEM CHECK, board status is checked and a SYSTEM CHECK printout is produced. If the 6007 module is determined to be good, a SYSTEM CHECK printout such as the following is produced.

626	626A
**********	****SYSTEM CHECK****
BD OPERATIONAL 626-PA-6007 CH 1 10/17/83 19:42:08	10/17/83 19:42:08 CH 1 626-PA-6007 BD OPERATIONAL
****SYSTEM CHECK ****	**********

If an abnormal condition is detected, the line BD OPERATIONAL may be replaced by one of the following:

INTERRUPT ERROR
INPUT ERROR
DATA ERROR

SYSTEM CHECK cannot be activated if the 6007 is programmed to 320 mSec minimum validation time. Any error causes the board to be turned off until the error is corrected or unit is reset. The DATA SUMMARY will display "BD OFF" as well as the usual message. Note that the SYSTEM CHECK printout starts and ends with asterisks.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

WARNING

Because of possible shock or fire hazards, connection of this instrument should be performed in compliance with the National Electrical Code (ANSI C1) and/or any other requirements which may be applicable to the user.

Installation, operation, and maintenance should be performed only by qualified personnel.

TM-111025U

VOLUME 1

OPERATOR'S MANUAL

626-PA-6008

TEMPERATURE AND HUMIDITY MONITOR

NOTE

Refer to Volume 2 (Service Manual) of TM-111025U for maintenance data.

1 May 1984
(Rev. 1 July 1984)
(Rev. 1 September 1985)
(Rev. 1 May 1986)

© COPYRIGHT 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. EDISON, NEW JERSEY.
ALL RIGHTS RESERVED.

DRANETZ
DRANETZ TECHNOLOGIES, INCORPORATED
1000 New Durham Rd., PO Box 4019, Edison, NJ 08818-4019

NOTICE CONCERNING DRANETZ' PROPRIETARY RIGHTS

This publication contains information proprietary to Dranetz Technologies, Inc. By accepting and using this manual, the user agrees that the information contained herein will be used solely for the purpose of repairing or operating equipment of Dranetz Technologies, Inc. These manuals are to be returned to Dranetz Technologies, Inc. when no longer required by the user, or when there is a change in ownership of the equipment.

These publications are protected under the Copyright laws of the United States Title 17 et seq. No part of this publication may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language or computer language, in any form, by any means, electronic, mechanical, magnetic, optical, chemical, manual, or otherwise, without the expressed written consent of Dranetz Technologies, Incorporated, 1000 New Durham Road, PO Box 4019, Edison, New Jersey 08818-4019.

TABLE OF CONTENTS

626-PA-6008 DC MONITOR

VOLUME 1

Section			Page
I	GENERAL INFORMATION		
	1.1	Scope	1-1
	1.2	Introduction	1-1
	1.3	Purpose	1-1
	1.4	Equipment Characteristics	1-2
	1.5	Standard Accessories	1-4
	1.6	Optional Accessories	1-4
	1.7	Factory Repair	1-4
II	INSTALLATION AND OPERATION		
	2.1	Installation	2-1
	2.1.1	Load Ratings	2-1
	2.2	Connecting Sensor Probes to Module	2-2
	2.2.1	Connection Procedure	2-2
	2.2.2	Applications	2-2
	2.3	Operating the 6002C	2-3
	2.3.1	Operating Controls and Indicators	2-3
	2.3.2	Programming Procedure	2-5
	2.4	Selecting the Factory/Option 101 Preset Program	2-7
	2.5	Description of Data Printouts	2-7
	2.5.1	Over Limit for Temperature or Humidity	2-8
	2.5.2	Under Limit for Temperature or Humidity	2-9
	2.5.3	Temperature or Humidity Change	2-9
	2.6	Short Term Accumulator	2-12
III.	OPERATIONAL TEST		
	3.1	General	3-1
	3.2	System Check	3-1

COPYRIGHT © 1981,1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

LIST OF ILLUSTRATIONS

Figure		Page
1-1	Effect of High Humidity on Drift	1-3
2-1	Series 626 Controls Used by the 6008 Plug-In.	2-4

LIST OF TABLES

Table		Page
1-1	626-PA-6008 Technical Specifications.	1-2
2-1	6008 Operating Controls	2-3

COPYRIGHT © 1981,1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

STATEMENT OF WARRANTY

ALL PRODUCTS OF DRANETZ TECHNOLOGIES, INC. ARE WARRANTED TO THE ORIGINAL PURCHASER AGAINST DEFECTIVE MATERIAL AND WORKMANSHIP FOR A PERIOD OF ONE YEAR FROM THE DATE OF DELIVERY. DRANETZ WILL REPAIR OR REPLACE, AT ITS OPTION, ALL DEFECTIVE EQUIPMENT RETURNED, FREIGHT PREPAID, DURING THE WARRANTY PERIOD, WITHOUT CHARGE FOR REPAIR, PROVIDED THERE IS NO EVIDENCE THAT THE EQUIPMENT HAS BEEN MIS-HANDLED OR ABUSED.

NOTE

The information in this manual has been reviewed and is believed to be entirely reliable. However, no responsibility is assumed for any inaccuracies. The material in this manual is for information purposes only, and is subject to change without notice.

VOLUME 1
OPERATOR'S MANUAL

626-PA-6008 TEMPERATURE AND HUMIDITY MONITOR

SECTION I
GENERAL INFORMATION

1.1 SCOPE

This manual consists of two volumes. Volume 1, the Operator's manual, consists of three sections: I) GENERAL INFORMATION, II) INSTALLATION AND OPERATION, and III) OPERATIONAL TEST. Volume 2, the Service manual, contains the maintenance instructions (Sections IV thru VII).

1.2 INTRODUCTION

This manual provides operating instructions for the 626-PA-6008 Temperature and Humidity Monitor Plug-in, hereinafter referred to as the 6008. The 6008 is designed for installation in the Series 626 Universal Disturbance Analyzer. It is assumed that the reader is familiar with the mainframe information described in Volume 1 of the Mainframe manual.

1.3 PURPOSE

The 6008 is a 2-channel module which monitors temperature and humidity. One channel monitors temperature from 0 to 100 degrees C; the other channel monitors relative humidity from 0 to 100% relative humidity (RH). With thresholds programmed by the user, the 6008 stores, analyzes, classifies and prints out quantitative and qualitative disturbance data. Accompanying the data is a printout of time derived from a highly accurate crystal-controlled 24-hour clock in the mainframe.

The 6008 monitors changes in any of these parameters, based on user programmable sensitivities and high and low limits. Each input takes eight readings over a 20-second period and then averages the readings to determine if a threshold or limit crossing has occurred. The sensitivity value of each type of disturbance, above which detection and printout occurs, is operator programmable. The time spent out of the user-programmable limits is also accumulated on a daily basis and made available from the data summary printouts. Except for an automatic summary printout at the end of each day, disturbance data is normally printed out only when disturbances occur. In an alternate mode, a disturbance summary printout occurs only at the end of each day. This feature permits long term unattended operation.

The threshold program may be easily altered, using the front panel switches. Cueing indicators adjacent to the programming switches

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

simplify the programming procedure. A back-up program for the plug-in, stored in hard memory at the factory, may always be recalled upon operator demand. Both the program and the disturbance data in the data accumulators may be printed out upon demand.

1.4 EQUIPMENT CHARACTERISTICS

The 6008 is configured as a plug-in module 6.5" high by 1.25" wide by 10" deep. It is designed for installation in any one of the five slots of the Series 626 Universal Disturbance Analyzer. Technical specifications of the 6008 are listed in Table 1-1.

Table 1-1

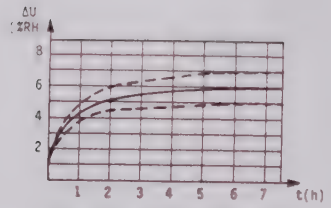
626-PA-6008 Specifications

Input Temperature	
Range:	1 to 100 deg C
Accuracy:	+/- 1 deg C
Cable Length:	100 ft max (30.5 m)
Cable Temperature:	105 deg C max
Input Relative Humidity	
Range:	0 to 80%* RH for $0 \leq T \leq 70^{\circ}C$
Accuracy:	+/- 3% RH +/- .05 (t-20) +/- .02 reading
Cable Length:	100 ft max (30.5 m)
Cable Temperature:	105 deg C max
Programmable Parameters	
Temperature	
Low limit	0 deg C min
High limit	102 deg C max
Sensitivity	1 deg C min max
Preset to	LO = 20, HI = 30, SENS = 2
Humidity	
Low limit	0% RH
High limit	102% RH
Sensitivity	1% RH min
Preset to	LO = 40, HI = 60, SENS = 5

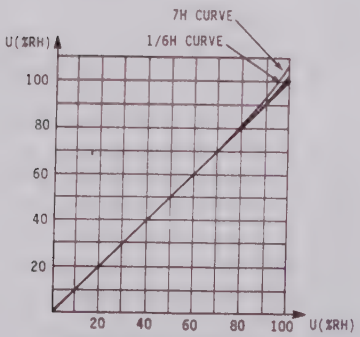
---

* Note additional drift above 80% RH. (See figure 1-1.)

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.



ADDITIONAL ERROR FOR EXTENDED
TIME SPENT > 95% RH



DRIFT DUE TO EXTENDED TIME
AT HIGH HUMIDITY

NOTE: UNIT SHOULD BE CALIBRATED AFTER SEVERAL HOURS AT HIGH HUMIDITY IF IS INTENDED TO BE USED IN THIS MANNER.

Figure 1-1. Effect of High Humidity on Drift

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

1.5 STANDARD ACCESSORIES

Model No.	Part No.	Quan.	Description
626-PA-6008, Vol. 1	TM-111025U	1	Operating Manual
	111061	1	Humidity Probe
	111059	1	Temperature Probe

1.6 OPTIONAL ACCESSORIES

Part No.	Description
111055	Extension cable for use with Humidity Probe. 90 foot (27 meter) cable extends total lead length to 100 feet (30 meters). Use only one extension cable per probe.
111056-G2	Extension cable for use with Temperature Probe. 90 foot (27 meter) cable extends total lead length to 100 feet (30 meters). Use only one extension cable per probe.
111058	Extension cable set combines 1 each 111055 AND 111056-G2.
TM-111025U, Vol. 2	Service (Maintenance) Manual

1.7 FACTORY REPAIR

When factory repair is required, proceed as follows:

1. Contact the Dranetz Service Corporation (formerly Dranetz Technologies, Inc., Customer Service Department) in order to obtain an Authorization Number for factory repair.

   Telephone No: (201) 755-7081

   TWX: (710) 997-9553

   Telex: 499-7808

   Cable: DRANETZ

2. Fill out the REPAIR/SERVICE ORDER form enclosed in the Series 626 Operating Manual and ship it with the malfunctioning equipment to the Dranetz Service Corporation.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986 BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

SECTION II
INSTALLATION AND OPERATION

2.1 INSTALLATION

To install the 6008 in the mainframe, proceed as follows:

CAUTION: Be sure 626 is turned off and that all power connected to all the plug-in modules is turned off.

a. Position the top and bottom front corners of the plug-in module in the upper and lower tracks at the desired slot position at the rear of the mainframe.

b. Carefully slide the module into the mainframe until it is firmly seated.

c. Tighten the top and bottom captive screws to secure the module to the mainframe.

2.1.1 Load Ratings

The Series 626 standard Mainframe has an upper limit of the total load rating of its installed modules. The overall Mainframe capacity is set at 20 Units. The individual modules have load ratings as follows:

Plug-in	Load Rating
626-PA-6001	2 Units
626-PA-6001 With Extra Option Board	3 Units
626-PA-6002	2 Units
626-PA-6003	4 Units
626-PA-6005	2 Units
626-PA-6006	2 Units
626-PA-6007	1 Unit
626-PA-6008	2 Units
626-PA-6009	4 Units
626-PA-6011	1 Unit
626-PA-6012	2 Units
626-PA-6012A	3 Units
626-PA-6013	2 Units
626-PA-6014	1 Unit
626-PA-6015	4 Units
626-PA-6018	4 Units
626-PA-6020	4 Units

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

NOTE

When selecting modules for installation into any Series 626 Mainframe, verify that the sum of the load ratings of the installed modules DOES NOT exceed 20 Units.

2.2 CONNECTING THE SENSOR PROBES TO THE MODULE

CAUTION

To avoid damaging the equipment, do not connect or disconnect the probes while the 626 is turned on.

2.2.1 Connection Procedure

The 6008 is supplied with two connectors on the rear panel. The 6-contact connector is used for the Humidity Probe (DTI P/N 111067) and the 3-contact connector is used for the Temperature Probe (DTI P/N 111059). Proceed as follows:

a. Insert key in FUNCTION key switch on the front panel of the mainframe and set switch to OFF position.

b. Attach the connectors on the two probes to the appropriate rear panel connectors.

2.2.2 Applications

The Humidity Probe can be taped in place, held with strips of Velcro, or hung using tie wraps with eyelets. The Temperature Probe can be hung with its metal clip taped in place, or fastened, using the included tie wraps.

Computer Specifications:

Computer manufacturers are more commonly paying attention to temperature and humidity within the computer room. One major manufacturer makes the following recommendations:

Temperature:	Minimum:	18°C (65°F)
	Maximum:	24°C (75°F)
Humidity:	Minimum:	40% R.H.
	Maximum:	60% R.H.

Specifications from individual companies should be available on request, from their Service departments. The 626-PA-6008 may then be programmed to match.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

2.3 OPERATING THE 6008

2.3.1 Operating Controls and Indicators

The functions of the mainframe operating controls and indicators associated with the 6008 are described in Table 2-1. Figure 2-1 shows the Series 626 controls associated with a 6008. For a description of controls common to overall Series 626 operation, refer to Volume 1 of the Mainframe manual.

Table 2-1. 6008 Operating Controls

Item	Function
INPUT pushbutton	Used to select temperature or humidity programming
LO LIMIT pushbutton	When depressed, enables the numeric keyboard to program low limit for temperature or humidity.
HI LIMIT pushbutton	When depressed, enables the numeric keyboard to program high limit for either input.
SENS pushbutton	When depressed, enables numeric keyboard to program sensitivity for either input.
NUMERIC pushbuttons	When single lamp lights, user is cued to press a "0" or "1" for temperature or humidity input, respectively. Also used to enter numerical values for other functions.
ENTER pushbutton	When depressed, transfers numeric keyboard values into 6008 memory for processing.
DATA pushbutton	When depressed, produces data summary printout.
PROG pushbutton	When depressed, produces a program summary printout.
PRESET pushbutton	With FUNCTION switch set to PROGRAM and a channel switch (1-5) depressed, depressing PRESET switch recalls non-volatile factory program for that input.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

Figure 2-1. Series 626 Controls Used by the 6008 Plug-In

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

2.3.2 Programming Procedure

Assume it is desired to program a temperature high limit of 35 deg C, a low limit of 15 deg C, and a sensitivity of 3 deg C. In addition, the humidity input is to be programmed for a high limit of 75%, a low limit of 35% and a sensitivity of 10%.

For the example cited, program the 6008 as follows:

a. Set FUNCTION switch to PROGRAM.

b. Depress the channel pushbutton (1-5) that corresponds to the slot position of the plug-in to be programmed. Note that a program summary for that channel is immediately printed.

c. Note that the red LED next to the INPUT pushbutton is lit. Press the INPUT pushbutton. Note that the following prompt message is printed and a single yellow LED is lit.

	626*	626A*	
↑	1 FOR HUMIDITY Ø FOR TEMPERATURE ENTER:	ENTER: Ø FOR TEMPERATURE 1 FOR HUMIDITY	↓

d. Depress a "Ø" or "1", depending on which input you wish to change. Note that the green LED adjacent to the ENTER key is lit, waiting for the ENTER key to be depressed.

(assume a "Ø" was depressed for the following example)

e. When the ENTER indicator goes out, an indicator above the center bank of pushbuttons lights. This indicates that one of the functions (HI LIMIT, LO LIMIT, SENSITIVITY) may now be programmed. At this time the PRESET button could also be depressed to change all of the parameters for temperature and humidity to the factory-preset values.

f. Depress the HI LIMIT pushbutton.

g. Note that three yellow LEDS above the numeric keyboard are now lit. Enter Ø35, using the keyboard. If an error is made, depress CLEAR ENTRY and then the correct entry. Note that the leading zero for numbers less than 1Ø0 must be entered.

h. When the value is entered, the lamp next to the ENTER pushbutton lights. Depress this pushbutton to enter the value.

i. Repeat steps c through h for the low limit value (Ø15), using the LO LIMIT pushbutton.

---

*If you are using a Model 626, read (from the bottom up) the "626" printouts in this manual; if using a "626A", read (from the top down) the "626A" printouts instead.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

j. Repeat steps c through h for the sensitivity value (Ø3), using the SENS pushbutton. Note that only two yellow LEDs light in step g.

k. The same sequence is used to change the humidity input, except a "1" is entered instead of a "Ø" in step c.

l. The completed program printout should take the following form:

626	626A
HIGH LIMIT Ø75	PROGRAM SUMMARY
LOW LIMIT Ø35	CH 2
SENS Ø1Ø	626-PA-6ØØ8
HUMIDITY	
	TEMPERATURE
↑ HIGH LIMIT Ø35	SENS ØØ3 ↓
LOW LIMIT Ø15	LOW LIMIT Ø15
SENS ØØ3	HIGH LIMIT Ø35
TEMPERATURE	
	HUMIDITY
626-PA-6ØØ8	SENS Ø1Ø
CH2	LOW LIMIT Ø35
PROGRAM SUMMARY	HIGH LIMIT Ø75

NOTE

The instrument is designed to detect an invalid entry. For example, if the high limit value is selected as 3Ø deg C, and the user selects a low limit value of 35 deg C, the following printout will appear.

626	626A
↑ HI LIMIT Ø3Ø	LO LIMIT Ø29 ↓
LO LIMIT Ø29	HI LIMIT Ø3Ø

m. When the plug-in program is completed, the user may proceed to program another module (by depressing another channel number) or he (she) may place the instrument on line by setting the FUNCTION switch to OPERATE. While on line, the program currently in effect may be obtained by simply depressing the PROG pushbutton.

COPYRIGHT © 1981,1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

2.4 SELECTING THE FACTORY/OPTION 101 PRESET PROGRAM

Note: Custom Preset Option 101 allows the user to choose his/her own program for the PRESET function.

To select the program stored in non-volatile memory, set the FUNCTION switch to PROGRAM and depress the channel member desired. The last operator-set program will be printed out. Now depress the PRESET pushbutton to recall the factory-set program. Unless specially modified to customer requirements, the factory-set program for the 6008 is as follows:

626	626A
HIGH LIMIT 075	PROGRAM SUMMARY
LOW LIMIT 025	CH 5
SENS 005	626-PA-6008
HUMIDITY	
	TEMPERATURE
HIGH LIMIT 030	SENS 004
LOW LIMIT 020	LOW LIMIT 015
SENS 002	HIGH LIMIT 035
TEMPERATURE	
	HUMIDITY
626-PA-6008	SENS 007
	LOW LIMIT 015
HIGH LIMIT 050	HIGH LIMIT 050
LOW LIMIT 015	
SENS 007	626-PA-6008
HUMIDITY	
	TEMPERATURE
HIGH LIMIT 035	SENS 002
LOW LIMIT 015	LOW LIMIT 020
SENS 004	HIGH LIMIT 030
TEMPERATURE	
	HUMIDITY
626-PA-6008	SENS 005
CH 5	LOW LIMIT 025
PROGRAM SUMMARY	HIGH LIMIT 075

2.5 DESCRIPTION OF DATA PRINTOUTS

When any of the disturbances described below is detected by the 6008, it is recorded and displayed in characteristic manner.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

2.5.1 Over Limit for Temperature or Humidity

An over limit condition exists when the monitored averaged value of temperature or humidity exceeds the user-specified upper limit for the respective input. An over limit condition is indicated by a printout such as the following:

```
4T HI 10:47:12.98
      or
4H HI 10:47:09.76
```

where the 4 is the channel number, the T is for temperature, the H is for humidity, and the time is given in hours, minutes and seconds (to 0.01 sec resolution).

When the temperature or humidity recovers to normal, a printout such as the following occurs:

626	626A
4T NOR 10:55:13.77	073.3 DEG C MAX
073.3 DEG C MAX	4T NOR 10:55:13.77
or	or
4H NOR 11:12:34.21	065.5 % RH MAX
065.5 % RH MAX	4H NOR 11:12:34.21

indicating when the normal temperature or humidity was restored and the value of the highest temperature or humidity reached during the over limit interval.

2.5.2 Under Limit for Temperature or Humidity

An under limit condition exists when the monitored temperature or humidity goes below the user-specified lower limit. An under limit condition is indicated by a printout such as the following:

```
4T LO 13:33:23.78
   or
4H LO 12:59:00.01
```

When the temperature or humidity returns to normal, a message such as the following is printed:

626	626A
4T NOR 13:44:56.98	003.1 DEG C MIN
003.1 DEG C MIN	4T NOR 13:44:56.98
or	or
4H NOR 12:59:58.99	024.2 % RH MIN
024.2 % RH MIN	4H NOR 12:59:58.99

indicating when the normal condition was restored and the value of the lowest temperature or humidity reached during the under limit interval.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

7.5.7 Temperature or Humidity Change

A temperature or humidity printout is triggered when the temperature or humidity changes more than a preselected amount from the last printed value. The change sensitivity is a user selected value, selected independently for temperature or humidity. The following examples show several temperature and humidity changes. The first shows a humidity increase; the second printout shows a temperature decrease. In each case, the time of each increase or decrease is also shown.

626	626A
2T DEC 01:22:34.76	087.3 % RH
013.3 DEG C	2H INC 01:23:55.32
2H INC 01:23:55.32	013.3 DEG C
087.3 % RH	2T DEC 01:22:34.76

The following example printouts show how various settings of the PRINTOUT MODE switch change the amount of detail in the printed record of a disturbance. It is assumed that the disturbances occurred in Channel 2 and that the limits for Channel 2 were programmed as follows:

T LOW LIMIT	20 DEG C
T HIGH LIMIT	30 DEG C
T SENSIVITY	02 DEG C
H LOW LIMIT	25 % RH
H HIGH LIMIT	75 % RH
H SENSITIVITY	05 % RH

Disturbances which occur while the PRINTOUT MODE switch is in the SUMMARY ONLY position do not generate individual printouts but they are stored in the daily accumulator and are automatically printed each day at midnight (worst case event and number of occurrences in each category). This printout may also be triggered manually by depressing the DATA button. The following is an example of a DATA summary:

COPYRIGHT © 1981,1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

626

```
TIME= 0000.6 MIN    time spent HI for humidity
MAX  102.1 % RH     max humidity value for day
HIGH  001 HT        number of high excursions
TIME= 0001.0 MIN    time spent LO for humidity
MIN  000.1 % RH     min. humidity value for day
LOW   002 HT        number of low excursions
PRES=070.4 % RH     present humidity level
   HUMIDITY
TIME= 0002.2 MIN    (same as above, except
MAX  032.8 DEG C       for temperature)
HIGH  003 HT
TIME= 0032.4 MIN
MIN  018.5 DEG C
LOW   020 HT
PRES=031.4 DEG C
  TEMPERATURE

  626-PA-6008
     CH2

10/17/83   10:48:15
   DATA SUMMARY

2T NOR 12:56.38.51     Printout of over limit
   078.2 DEG C         in OUT-OF-LIMITS ONLY mode

2T HI 12:56:34.52

2H NOR 03:55:45.98
   013.5 % RH

2H INC 03:53:34.89
   024.8 % RH

2H INC 03:50:57.67     Printout of under limit
   019.3 % RH          in NORMAL mode.

2H DEC 03:40.11.23
   013.5 % RH

2H DEC 03:39:45.33
   021.1 % RH

2H LO 03:39:45.33
```


COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

626A

```
2H LO 03:39:45.33

   021.1 % RH
2H DEC 03:39:45.33

   013.5 % RH
2H DEC 03:40:11.23

   019.3 % RH
2H INC 03:50:57.67

   024.8 % RH
2H INC 03:53:34.89

   013.5 % RH
2H NOR 03:55:45.98

2T HI 12:56:34.52

   078.2 DEG C
2T NOR 12:56:38.51

   DATA SUMMARY
10/17/83   10:48:15

       CH2
  626-PA-6008

  TEMPERATURE
PRES=031.4 DEG C
LOW    020 HT
MIN    018.5 DEG C
TIME= 0032.4 MIN
HIGH   003 HT
MAX    032.8 DEG C
TIME= 0002.2 MIN
   HUMIDITY
PRES=070.4 % RH
LOW    002 HT
MIN    000.1 % RH
TIME= 0001.0 MIN
HIGH   001 HT
MAX    102.1 % RH
TIME= 0000.6 MIN
```

Printout of under limit in NORMAL mode.

Printout of over limit in OUT-OF-LIMITS ONLY mode.

present temperature level
number of low excursions
min. temperature value for day
time spent LO for temperature
number of high excursions
maximum temperature value for day
time spent HI for temperaturer

(same as above, except for humidity)

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

2.6 SHORT TERM ACCUMULATOR

If disturbances should take place at a rate faster than the 626 mainframe can process and print them out (and the internal event stack memory should overflow), then subsequent events until the overflow condition is cleared, are stored in summary form in the Short Term Accumulators. These values are cleared out after the printout of the Short Term Accumulators is complete. The format is identical to the Data Summary except there are no accumulated time values, and the values are printed out only when a HI or LO limit was crossed to expedite the printing.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

SECTION III
OPERATIONAL TEST

3.1 GENERAL

This section provides information for performing an operational test to verify that the 6008 plug-in is operating properly.

3.2 SYSTEM CHECK

When the PRINTOUT mode switch is set to SYSTEM CHECK, the precision reference signals are applied to the measuring circuitry. The probe inputs are disconnected during this time. These signals verify the functionality of the module, but not the actual sensors. The sensors can be checked by use of a calibrated standard (for temperature, a precise temperature chamber; and for humidity, a low and high end calibration salt bath). The allowable tolerance levels are shown below, along with a sample printout:

526		626A	
**********		**********	
H=010.2	+/-0.3	***SYSTEM CHECK***	
T=091.9	+/-0.6	10/14/83 12:34:56	↓
526-PA-6008			
CH2		CH2	
		626-PA-6008	
10/14/83 12:34:56		T=091.9	+/-0.6
SYSTEM CHECK		H=010.2	+/-0.3
**********		**********	

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

WARNING

Because of possible shock or fire hazards, connection of this instrument should be performed in compliance with the National Electrical Code (ANSI C1) and/or any other requirements which may be applicable to the user.

Installation, operation, and maintenance should be performed only by qualified personnel.

TM-110650U

VOLUME I

OPERATOR'S MANUAL

626-PA-5009

3 PHASE 400 HZ AC MONITOR

NOTE

Refer to Volume 2 (Service Manual) of TM-110650U for maintenance data.

1 May 1984
(Rev. 15 May 1985)
(Rev. 1 September 1985)
(Rev. 15 June 1986)

© COPYRIGHT 1981, 1982, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. EDISON, NEW JERSEY.
ALL RIGHTS RESERVED

DRANETZ

DRANETZ TECHNOLOGIES, INC.
1000 New Durham Rd., PO Box 4019
Edison, New Jersey 08818-4019

NOTICE REGARDING DRANETZ' PROPRIETARY RIGHTS

This publication contains information proprietary to Dranetz Technologies, Inc. By accepting and using this manual, the user agrees that the information contained herein will be used solely for the purpose of repairing or operating equipment of Dranetz Technologies, Inc. These manuals are to be returned to Dranetz Technologies, Inc. when no longer required by the user, or when there is a change in ownership of the equipment.

These publications are protected under the Copyright laws of the United States Title 17 et seq. No part of this publication may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language or computer language, in any form, by any means, electronic, mechanical, magnetic, optical, chemical, manual, or otherwise, without the expressed written consent of Dranetz Technologies, Incorporated, 1000 New Durham Road, PO Box 4019, Edison, New Jersey 08818-4019.

TABLE OF CONTENTS

626-PA-6009 3 PHASE 400 HZ AC MONITOR

VOLUME 1

Section		Page
I	GENERAL INFORMATION	
1.1	Scope	1-1
1.2	Introduction	1-1
1.3	Purpose	1-1
1.4	Applications	1-2
1.5	Equipment Characteristics	1-2
1.6	Standard Accessories	1-4
1.7	Optional Accessories	1-4
1.8	Factory Repair	1-4
II	INSTALLATION AND OPERATION	
2.1	Installation	2-1
2.1.1	Load Ratings	2-1
2.2	Connecting Power Source to Module	2-2
2.2.1	Connection Procedure	2-2
2.2.2	Applications	2-2
2.2.3	Installation Guidelines	2-5
2.3	Operating the 6009	2-6
2.3.1	Operating Controls and Indicators	2-6
2.3.2	Programming Procedure	2-6
2.4	Selecting the Factory/Option 101 Preset Program	2-10
2.5	Description of Data Printouts	2-10
2.5.1	Overvoltage	2-10
2.5.2	Undervoltage	2-11
2.5.3	Voltage Change	2-11
2.5.4	Voltage Surge	2-12
2.5.5	Voltage Sag	2-12
2.5.6	Impulses	2-13
2.5.7	Frequency Change	2-13
2.6	Printout Modes	2-14
III	OPERATIONAL TEST	
3.1	General	3-1
3.2	System Check	3-1

COPYRIGHT © 1981, 1982, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

LIST OF ILLUSTRATIONS

Figure		Page
2-1	Recommended 3-Phase Connections	2-6
2-2	Series 626 Controls Used by the 6009 Plug-In. . .	2-7
2-3	Overvoltage Disturbance (6009).	2-15
2-4	Voltage Sag Disturbance (6009).	2-15

LIST OF TABLES

Table		Page
1-1	626 PA-6009 Technical Specifications.	1-3
2-1	6009 Operating Controls	2-8

COPYRIGHT © 1981, 1982, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

STATEMENT OF WARRANTY

ALL PRODUCTS OF DRANETZ TECHNOLOGIES, INC. ARE WARRANTED TO THE ORIGINAL PURCHASER AGAINST DEFECTIVE MATERIAL AND WORKMANSHIP FOR A PERIOD OF ONE YEAR FROM THE DATE OF DELIVERY. DRANETZ WILL REPAIR OR REPLACE, AT ITS OPTION, ALL DEFECTIVE EQUIPMENT RETURNED, FREIGHT PREPAID, DURING THE WARRANTY PERIOD, WITHOUT CHARGE FOR REPAIR, PROVIDED THERE IS NO EVIDENCE THAT THE EQUIPMENT HAS BEEN MIS-HANDLED OR ABUSED.

NOTE

The information in this manual has been reviewed and is believed to be entirely reliable. However, no responsibility is assumed for any inaccuracies. The material in this manual is for information purposes only, and is subject to change without notice.

VOLUME I
OPERATOR'S MANUAL

626-PA-6009 3 PHASE 400 HZ AC MONITOR

SECTION I
GENERAL INFORMATION

1.1 SCOPE

This manual consists of two volumes. Volume 1, the Operator's manual, is divided into three sections: I) GENERAL INFORMATION, II) INSTALLATION AND OPERATION, and III) OPERATIONAL TEST. Volume 2, the Service manual, contains the maintenance instructions.

1.2 INTRODUCTION

This manual provides instructions for the 626-PA-6009 plug-in, hereinafter referred to as the 6009 plug-in. The 6009 plug-in is designed for installation into the Series 626 Universal Disturbance Analyzer, referred to as the Series 626. It is assumed that the reader is familiar with the mainframe information described in Volume 1 of the Mainframe manual.

1.3 PURPOSE

The 6009 monitors disturbances on 3-phase 400 Hz AC power lines. Each phase is monitored on a single voltage range of 0 to 600V RMS. With thresholds programmed by the user, the 6009 monitors both short and long term power line disturbances. With this plug-in, the unit stores, analyzes, classifies and prints out quantitative and qualitative disturbance data. Accompanying the data is a printout of time derived from a highly accurate crystal-controlled 24-hour clock in the mainframe.

The plug-in monitors any 3-phase power line whose RMS values range from a low value of 0 volts to as high as 600 volts. Three types of disturbances are monitored by the 6009: power line frequency, power frequency transients and waveform disturbances. Power frequency transients are divided into five display categories: overvoltage, undervoltage, voltage change, voltage surge and voltage sag. Waveform disturbances, identified as "impulses", include all conditions that cause the power line waveform to deviate from an ideal waveform. The 6009 measures the peak amplitude of impulses, their polarity and duration. The threshold value of each type of disturbance, as well as the line frequency, above which detection and printout occurs is operator programmable. (All threshold settings are common to all three line phases.) Except for an automatic summary printout at the end of each day, disturbance data is normally printed out only when

© COPYRIGHT 1981, 1982, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

disturbances occur. In an alternate mode, a disturbance data summary printout occurs only at the end of each day. This feature permits long term unattended operation.

The threshold program may be easily altered, using the front panel switches. Cueing indicators adjacent to the programming switches simplify the programming procedure. A back-up program for the plug-in, stored in hard memory at the factory, may always be recalled upon operator demand. Both the program and the disturbance data in the data accumulators may be printed out upon demand.

NOTE: Frequency measurements are derived from phase A only. Therefore, if single-phase monitoring is desired, phase A should be used.

1.4 APPLICATIONS

When installed in the 626 mainframe, the 6009 provides the capability of monitoring and evaluating power system performance. Among its typical applications are the following:

a. To determine the effect of power system operation on equipment malfunction. The time-referenced power fault disturbance record produced by the instrument permits rapid correlation of errors, outages, and equipment damage in computer, industrial process controls, digital communications equipment, medical monitoring apparatus, and so forth, to power line faults.

b. To perform pre-installation site surveys. The 6009 can be used to determine the adequacy of existing power lines intended to support critical electrical equipment. Anticipation of power problems saves time, money, and future trouble.

c. For diagnostic evaluation of power system performance. The portable instrument, particularly well suited for field use, is ideal for determining the probable causes of, and remedies for, power line disturbances.

d. For monitoring life test racks. The printout produced by the instrument provides a clear record of the quality of power supplied during unattended periods.

1.5 EQUIPMENT CHARACTERISTICS

The 6009 is configured as a plug-in module 6.5" high by 1.25" wide by 10" deep. It is designed for installation in one of four slots of the Series 626 Universal Disturbance Analyzer. Technical specifications of the 6009 are presented in Table 1-1.

© COPYRIGHT 1981, 1982, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

Table 1-1. 626 PA-6009 Technical Specifications

Input	2 wire differential Z_{in} = 40 Megohms plus 40 pf (each side to ground)
Input Voltage Range	50-600V RMS
Lower Limit of User-Set Voltage (V_{LOW})	50V to 599V
Upper Limit of User-Set Voltage (V_{HIGH})	51V to 600V
Voltage Change Sensitivity (V_{SENS}) (1V Increments)	2 to 60V
Line Voltage Measurement Resolution	0.2V
Line Voltage Measurement Accuracy	± 1% of reading, ± 0.2% of full scale (75V to 600V)
Line Frequency	
Range	370 - 450 Hz
Resolution	± 0.1 Hz
Accuracy	± 0.1 Hz
Impulse Range	50-4000V Pk (1-100 uSec)
Impulse Peak Resolution	1V
Impulse Accuracy	± 10% of reading ± 1% F.S. (5 uSec - 25 uSec.) (decreasing to 6 dB from 1 uSec to 100 uSec) 100V-4000V
Impulse Duration Range	1 uSec to 100 uSec
Impulse Duration Resolution	1 uSec

© COPYRIGHT 1981, 1982, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

1.6 STANDARD ACCESSORIES

MODEL NO.	PART NO.	QUAN.	DESCRIPTION
626-PA-6009	TM-110650U (Vol. 1)	1	Operating Manual

1.7 OPTIONAL ACCESSORIES

Model No.	Part No.	Quan.	Description
626-PA-6009	TM-110650U (Vol. 2)	1	Service (Maintenance) Manual

1.8 FACTORY REPAIR

When factory repair is required, proceed as follows:

1. Contact the Dranetz Service Corporation (formerly Dranetz Technologies, Inc., Customer Service Department) in order to obtain an Authorization Number for factory repair.

   Telephone No: 201-755-7081

   TWX: (710) 997-9553

   Telex: 499-7808

   Cable: DRANETZ

2. Fill out the REPAIR/SERVICE ORDER form enclosed in the Series 626 Operating Manual. Ship it along with the malfunctioning equipment to the Dranetz Service Corporation.

© COPYRIGHT 1981, 1982, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

SECTION II
INSTALLATION AND OPERATION

2.1 INSTALLATION

The 6009 may be installed in any mainframe plug-in slot* as follows:

CAUTION: Be sure the 626 is turned off, and that all power connected to all plug-in modules is turned off.

a. With the rear panel markings reading correctly, carefully slide the module into the desired slot with the Digital board within the card-guide tracks, until it is firmly seated.

b. Tighten the top and bottom captive screws to secure the module to the mainframe.

2.1.1 Load Ratings

The Series 626 standard Mainframe has an upper limit of the total load rating of the installed modules. The overall Mainframe capacity is set at 20 units. The individual modules have load ratings as follows:

Plug-in	Load Rating
626-PA-6001	2 Units
626-PA-6001 W/Extra Option Bd	3 Units
626-PA-6002	2 Units
626-PA-6003	4 Units
626-PA-6005	2 Units
626-PA-6006	2 Units
626-PA-6007	1 Unit
626-PA-6008	2 Units
626-PA-6009	4 Units
626-PA-6011	1 Unit
626-PA-6012	2 Units
626-PA-6012A	3 Units
626-PA-6013	2 Units
626-PA-6014	1 Unit
626-PA-6015	4 Units
626-PA-6018	4 Units
626-PA-6020	4 Units
626-PA-6024A	4 Units
626-PA-6024B	4 Units
626-PA-6030	6 Units

NOTE

When selecting modules for installation into any Series 626 Mainframe, verify that the sum of the load ratings of its installed modules DOES NOT exceed 20 Units.

---

* On some older mainframes, slot 5 may not be used for a 6009. A decal will indicate this.

© COPYRIGHT 1981, 1982, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

2.2 CONNECTING POWER SOURCE TO MODULE

2.2.1 Connection Procedure

The 6009 is equipped with a 9-position screw terminal barrier block. The "+" and "-" markings for each phase indicate a polarity reference for impulse measurement. Terminals marked " " for earth ground are all internally connected to the 626 mainframe metal chassis. Be absolutely certain of the configuration (delta or wye) of the supply to be monitored before proceeding.

a. Insert key in FUNCTION key switch on front panel of mainframe and set switch to OFF position.

b. Turn off AC power source that is to be monitored.

c. Following the recommended connections for the appropriate configuration (See fig. 2-1), attach the wires indicated to the terminals on the rear panel of the 6009. Reapply AC power.

CAUTION

To avoid damaging equipment, do not apply AC voltages in excess of 600V RMS to any AC phase (A, B, or C) applied to the 6009.

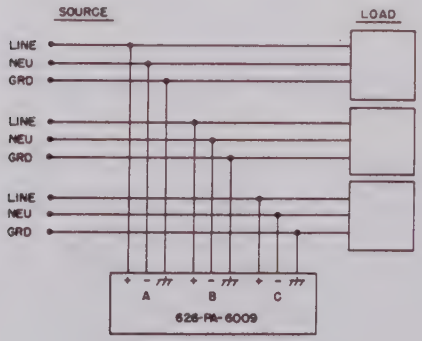
2.2.2 Applications

The 3 phase AC monitor for 350-450 Hz may be used for 3 phase wye, 3 phase delta, or for up to three separate AC signals. Note that the plug-in monitors only the voltage difference between its + and - inputs, with the ⏚ input acting only as a common grounding point. The ⏚ input is tied to the safety grounding conductor on the 626 power plug, so be careful not to inadvertently contaminate a "clean" computer ground with a "dirty" building ground.

© COPYRIGHT 1981, 1982, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

WARNING

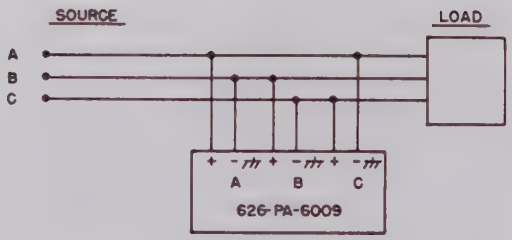
Connection should only be performed by qualified personnel. Conductors connecting to measurement points should be approved for the specific use. When connected to branch circuits of 20 amperes or less, minimum flexible cord size is No. 18 (1 mm^2). For branch circuits with higher ampacity, refer to National Electric Code (ANSI CI-1975 Para. 240-4 and Para. 250-95). Special consideration of ground may be required. Refer to Article 250 of above reference if in doubt. Outside U.S.A. consult applicable safety standards.



3 Separate AC Lines

Notes 1. All channels are monitored independently.
2. All line frequencies must be the same.
3. All 3 channels will have same program set-up.

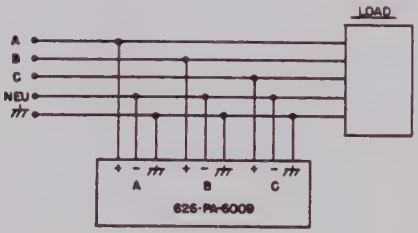
© COPYRIGHT 1981, 1982, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.



3 Phase Delta

Notes

1. Delta may be grounded or ungrounded.
2. Set 626-PA-6009 to monitor Line-to-Line voltage, e.g., for 240 volts, set High and Low limits to either side of 240 VAC.



3 Phase Wye

Notes

1. Wye distribution is normally monitored Line-to-Neutral, e.g., a 120/208 wye would be monitored with 626-PA-6009 High and Low limits set to either side of 120.

2. To monitor wye system Line-to-Line, set High and Low limits to either side of higher stated voltage, and connect to 626-PA-6009 as though lines A, B, and C were from a delta, e.g., a 120/208 wye would be monitored with 626-PA-6009 High and Low limits set to either side of 208.

© COPYRIGHT 1981, 1982, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

2.2.3 Installation Guidelines

Proper monitoring and analysis of AC and DC voltage disturbances requires careful attention to the method of connection between the Series 626 Universal Disturbance Analyzer and the monitored circuit. To obtain the most accurate and relevant voltage monitoring data, the following suggested guidelines should be utilized.

1. To minimize spurious Impulse transients and interchannel coupling, always use the Dranetz test cables supplied with the 626. If cables are not supplied, such as with the barrier strip input modules, the test cable should be composed of twisted-pair wires for each input channel.

2. Test cable length should be minimized, preferably less than 9 feet from the Series 626 to the circuit connection point. This will minimize amplitude variation of Impulse transients.

3. If monitoring a power line connected to critical, sensitive load equipment, the test cable should be connected to the power line as close as possible to the load. For three-phase loads, the 626 should be connected in the same way as the load equipment; i.e. Phase to Phase or Phase to Neutral.

4. Use of instrument-grade Potential Transformers for monitoring Impulses on high voltage power lines is not recommended. The limited frequency response of most Potential Transformers may result in substantial variation of Impulse amplitude.

5. The Series 626 is designed to operate from disturbed power lines. Therefore, the 626 power supply may be connected to the same power line that is being monitored. However, the user should be aware that the extensive transient suppression incorporated with the 626 power supply may alter the transient characteristics of the AC power line to which the power supply is connected. If the user wishes to prevent alteration of the transient characteristics of the power line being monitored, the 626 power supply input should be separated from the monitored inputs.

6. The ground terminals of the plug-in modules are connected internally to the safety grounding conductor in the 626 power plug. Be careful not to inadvertently contaminate a "clean" ground with a "dirty" ground.

© COPYRIGHT 1981, 1982, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

2.3 OPERATING THE 6009

2.3.1 Operating Controls and Indicators

The functions of the mainframe operating controls and indicators associated with 6009 operation are described in Table 2-1. Figure 2-2 shows the typical front panel controls associated with the 6009. For a description of controls common to overall Series 626 operation, refer to Volume 1 of the Mainframe manual.

2.3.2 Programming Procedure

Assume it is desired to program a high limit of 125V, a low limit of 105V, voltage sensitivity of 2 volts, frequency sensitivity of 2 Hz and an impulse sensitivity of 50V. Sensitivity sets the deviation from the present value above or below which a detected value produces a recorded disturbance. This is true for both voltage and frequency.

For impulse measurements, the sensitivity corresponds to the absolute threshold, so that for an impulse sensitivity of 50 volts, a disturbance is recorded when impulse amplitude is greater than or equal to 50 volts.

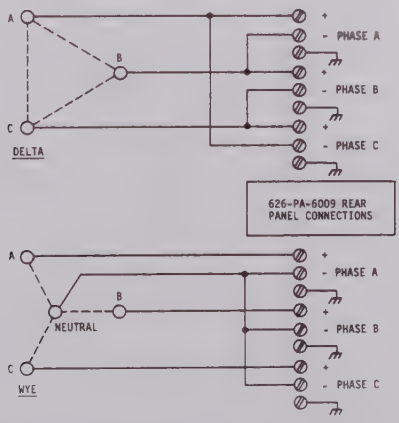


Figure 2-1. Recommended 3-Phase Connections

© COPYRIGHT 1981, 1982, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

Figure 2-2. Series 626 Controls Used by the 6009 Plug-In

COPYRIGHT © 1981, 1982, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

Table 2-1. 6009 Operating Controls

Item	Function
LO LIMIT pushbutton	When depressed, enables numeric keyboard to program low limit voltage.
HI LIMIT pushbutton	When depressed, enables numeric keyboard to program high limit voltage.
SENS PUSHBUTTON	When depressed, enables numeric keyboard to program voltage sensitivity value.
IMP SENS pushbutton	When depressed, enables numeric keyboard to program impulse voltage sensitivity value.
F SENS pushbutton	When depressed, enables numeric keyboard to program frequency sensitivity value.
ENTER pushbutton	When depressed, transfers numeric keyboard value into the 6009 memory.
DATA pushbutton	When depressed, produces data summary printout.
PRESET pushbutton	With FUNCTION switch set to PROGRAM and a channel switch (1-5) depressed, depressing PRESET switch recalls nonvolatile factory program for that channel.

For the example cited, program the 6009 as follows:

a. Set FUNCTION switch to PROGRAM.

b. Depress the channel pushbutton (1-5) that corresponds to the slot position of the plug-in to be programmed. Note that a program summary for that channel is immediately printed.

c. Note that a red cueing indicator above the center bank of pushbuttons lights. This indicates that a function may be programmed.

© COPYRIGHT 1981, 1982, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

d. Depress the HI LIMIT pushbutton. Program the high limit value (125), using the keyboard.

e. When the green ENTER indicator lights, depress the ENTER pushbutton. The programmed high limit value will be echoed back on the printout and the ENTER indicator will go out.

f. Repeat steps c, d and e for the low limit voltage (105V), using the LO LIMIT pushbutton.

g. Repeat steps c, d and e for the voltage sensitivity, using the SENS pushbutton and programming the voltage value as 02.

h. Repeat setps c, d, and e for the frequency sensitivity (2 Hz), using the F SENS pushbutton and programming the value as 2.

i. Repeat steps c, d and e for the impulse sensitivity (0050 volts), using the IMP SENS pushbutton. The completed program printout should take the following form:

626*

IMPULSE SENS	0050V
FREQ SENS	2.0 HZ
VOLTAGE SENS	002 V
V LOW LIMIT	105 V
V HIGH LIMIT	125 V
26-PA-6009	
CH 4	

626A*

CH 4	
626-PA-6009	
V HIGH LIMIT	125V
V LOW LIMIT	105V
VOLTAGE SENS	002 V
FREQ SENS	2.0 HZ
IMPULSE SENS	0050V

NOTE

The instrument is designed to detect an invalid entry and to automatically shift high and low limits.

j. When the plug-in program is completed, the user may proceed to program another module (by depressing another channel number) or he may place the instrument on line by setting the FUNCTION switch to OPERATE. While on line, the program in effect may be obtained by simply depressing the PROG pushbutton.

If you are using a Model 626, read (from the bottom up) the "626" printouts in this manual; if using a Model 626A, read (from the top down) the "626A" printouts instead.

© COPYRIGHT 1981, 1982, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

2.4 SELECTING THE FACTORY/OPTION 101 PRESET PROGRAM

NOTE: Custom Preset Option 101 allows the user to choose his/her own program setup for the PRESET function.

To select the program stored in hard memory, set the FUNCTION switch to PROGRAM and depress the channel number desired. The last operator-set program will be printed out. Now depress the PRESET pushbutton to recall the factory-set program. An example of this sequence appears below. The first group of printouts is the operator program; the second is the factory program.

626	626A
IMPULSE SENS 0100V	PROGRAM SUMMARY
FREQ SENS 00.5 HZ	CH 1
VOLTAGE SENS 002 V	626-PA-6009
V LOW LIMIT 105 V	V HIGH LIMIT 125 V
V HIGH LIMIT 120 V	V LOW LIMIT 105 V
625-PA-6009	VOLTAGE SENS 002V
CH 1	FREQ SENS 2.0 HZ
PROGRAM SUMMARY	IMPULSE SENS 0050V
IMPULSE SENS 0050V	PROGRAM SUMMARY
FREQ SENS 2.0 HZ	CH 1
VOLTAGE SENS 002 V	626-PA-6009
V LOW LIMIT 105 V	V HIGH LIMIT 120 V
V HIGH LIMIT 125 V	V LOW LIMIT 105 V
626-PA-6009	VOLTAGE SENS 002 V
CH 1	FREQ SENS 00.5 HZ
PROGRAM SUMMARY	IMPULSE SENS 0100V

2.5 DESCRIPTION OF DATA PRINTOUTS

When any of the disturbances described below is detected by the 6009, it is recorded and displayed in characteristic manner.

2.5.1 Overvoltage

An overvoltage condition exists when the monitored power line voltage exceeds the user-specified upper limit for more than 2.55 seconds. An overvoltage condition is indicated by a printout such as the following:

4B HI 09:46:07.11

where 4 is the channel number, B is the phase and time is given in hours, minutes and seconds (to .01 second resolution).

© COPYRIGHT 1981, 1982, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

When the line voltage recovers to normal, a printout such as the following occurs:

626	626A
↑ 4B NOR 09:46:15.20 148.6 V MAX	148.6 V MAX 4B NOR 09:46:15.20 ↓

indicating when normal voltage was restored and the value of the highest voltage reached during the overvoltage interval.

2.5.2 Undervoltage

An undervoltage condition exists when the monitored power line voltage remains below the user-specified lower limit for more than 2.55 seconds. An undervoltage condition is indicated by a printout such as the following:

```
4C  LO  09:46:15.20
```

When the line voltage returns to normal level, a message such as the following is printed:

626	626A
↑ 4C NOR 09:46:18.45 36.4 V MIN	36.4 V MIN 4C NOR 09:46:18.45 ↓

indicating when normal voltage was restored and the value of the lowest voltage reached during the undervoltage interval.

2.5.3 Voltage Change

A voltage change printout is triggered when the line voltage changes more than a preselected amount from the last printed value. The voltage change sensitivity is a user-selected integral voltage between 2 and 60 volts. The following example shows several voltage change printouts. The first shows a decrease to 109.2V in the Channel 3 phase A voltage; the second illustrates an increase to 115.4V in the channel 2 phase C voltage (both changes at times shown).

626	626A
↑ 2C INC 01:02:34.56 115.4 V	109.2 V 3A DEC 01:02:34.56 ↓
3A DEC 01:02:34.56 109.2 V	115.4 V 2C INC 01:02:34.56

© COPYRIGHT 1981, 1982, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

2.5.4 Voltage Surge

A voltage Surge is defined as a line voltage which increases through a user-selected upper limit and then returns to an in-tolerance condition in less than 2.56 seconds. When a surge begins, its starting time is printed as follows:

```
4B   H1   09:45:33.15
```

When the line voltage returns to a normal level following a surge condition, a message such as the following will be printed:

```
        626                              626A
↑  4B  NOR  09:45:33.38          SURGE 0.23 SEC   ↓
       128.2  V  MAX             128.2  V  MAX
       SURGE 0.23 SEC       4B  NOR 09:45:33.38
```

In this case, the time at which the voltage returned to normal is shown as well as the maximum voltage reached and the surge duration.

2.5.5 Voltage Sag

A Voltage Sag is defined as a line voltage that decreases below the user-selected lower limit and then returns to an in-tolerance condition in less than 2.56 seconds. Sag printouts take the same form as surge printouts, with the term SAG replacing the term SURGE, and the term MIN replacing the term MAX.

NOTE

Voltage inputs less than 10V RMS will be printed out as 0.0V on the 5009.

COPYRIGHT © 1981, 1982, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

2.5.6 Impulses

"Impulse" disturbances represent any line perturbation which contains frequency components in the 5 kHz to 500 kHz range. An impulse type disturbance produces a printout such as the following:

626	626A
2A IMP 10:12:13.45 +0139 V, 0010 US	+0139 V, 0010 US 2A IMP 10:12:13.45

This printout indicates that an impulse which deviated from normal line voltage by +139 volts peak, and whose duration was 10 microseconds, was detected on phase A of Channel 2 at the time shown. Impulse polarity is referenced to "+" and "-" markings on the rear panel.

2.5.7 Frequency Change

A frequency change printout is triggered when the line frequency changes more than a preselected amount from the last printed value. The frequency change sensitivity is a user-selected value between 1 Hz and 9 Hz in 1 Hz increments. The following example shows several frequency change printouts.

626	626A
3 FRQ 13:24:20.45 404.0 HZ	396.0 HZ 3 FRQ 13:23:59.89
3 FRQ 13:24:16.1 402.0 HZ	398.0 HZ 3 FRQ 13:24:04.8
3 FRQ 13:24:10.4 400.0 HZ	400.0 HZ 3 FRQ 13:24:10.4
3 FRQ 13:24:04.8 398.0 HZ	402.0 HZ 3 FRQ 13:24:16.1
3 FRQ 13:23:59.89 396.0 HZ	404.0 HZ 3 FRQ 13:24:20.45

COPYRIGHT © 1981, 1982, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

2.6 PRINTOUT MODES

The setting of the PRINTOUT MODE switch on the front panel of the mainframe determines hoow much detail is printed oout. Printout data is reduced as the switch is rotated counterclockwise.

The following sample printouts show how various settings of the PRINTOUT MODE switch change the amount of detail in the printed record of a disturbance. It is assumed that the disturbances occurred in phase A of Channel 1 and that the limits for Channel 1 were programmed as follows:

V	LOW LIMIT	105 Vrms
V	HIGH LIMIT	125 Vrms
V	SENSITIVITY	2 Vrms

The sample printouts are referenced to figures 2-3 and 2-4 which illustrate overvoltage and voltage sag disturbances, respectively.

Disturbances which occur while the PRINTOUT MODE switch is in the SUMMARY ONLY position do not generate individual printouts but thay are stored in the daily accummulator and are automatically printed each day at midnight (worst case event and number of occurrences in each category). This printout may also be triggered manually by depressing the DATA pushbutton.

COPYRIGHT © 1981, 1982, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

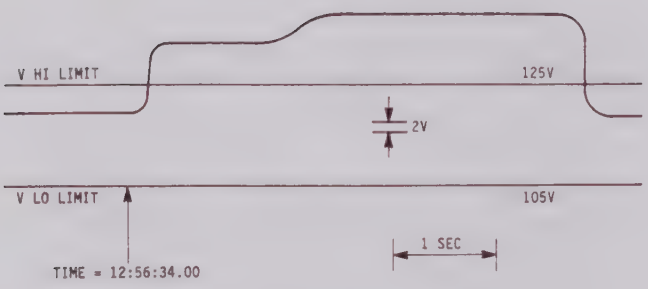


Figure 2-3. Overvoltage Disturbance (6009)

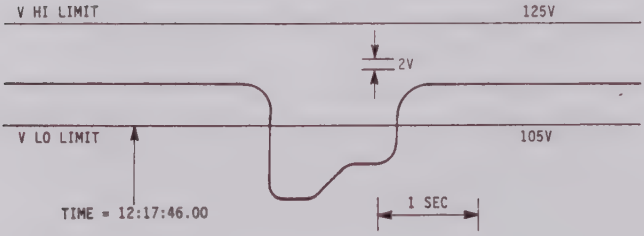


Figure 2-4. Voltage Sag Disturbance (6009)

© COPYRIGHT 1981, 1982, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

The first printout below illustrates overvoltage (fig. 2-3) in the NORMAL mode. The second illustrates overvoltage in the OUT-OF-LIMITS ONLY mode.

626

```
1A  NOR  12:56:38.51
     139.1 V MAX

1A  HI   12:56:34.21


1A  NOR  12:56:38.51
     139.1 V MAX



1A  DEC  12:56:58.50
     130.2 V

1A  INC  12:56:35.78
     137.3 V

1A  INC  12:56:35.62
     135.3 V

1A  INC  12:56:35.40
     133.3 V

1A  INC  12:56:34.22
     131.3 V

1A  INC  12:56:34.21
     129.2 V

1A  HI   12:56:34.21
```

626A

```
1A  HI   12:56:34.21

     129.2 V
1A  INC  12:56:34.21

     131.3 V
1A  INC  12:56:34.22

     133.3 V
1A  INC  12:56:35.40

     135.3.V
1A  INC  12:56:35.62

     137.3 V
1A  INC  12:56:35.78

     130.2 V
1A  DEC  12:56:58.50

     139.1 V MAX
1A  NOR  12:56:38.51


1A  HI   12:56:34.21

     139.1 V MAX
1A  NOR  12:56:38.51
```


COPYRIGHT © 1981, 1982, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

The following printout illustrates printout of overvoltage (fig. 2-3) in the MAXIMUM DETAIL mode.

626

```
1A  DEC  12:56:38.61
    119.8 V

1A  DEC  12:56:38.53
    121.8 V

1A  DEC  12:56:38.51
    124.0 V

1A  NOR  12:56:38.51
    139.1 V MAX

1A  DEC  12:56:38.50
    130.2 V

1A  INC  12:56:35.78
    137.3V

1A  INC  12:56:35.62
    135.3 V

1A  INC  12:56:35.40
    133.3 V

1A  INC  12:56:34.22
    131.3V

1A  INC  12:56:34.21
    129.2 V

1A  HI   12:56:34.21

1A  INC  12:56:34.20
    121.1 V

1A  INC  12:50:12.34
    119.0 V
```

626A

```
    119.0 V
1A  INC  12:50:12.34

    121.1 V
1A  INC  12:56:34.20

1A  HI   12:56:34.21

    129.2 V
1A  INC  12:56:34.21

    131.3 V
1A  INC  12:56:34.22

    133.3 V
1A  INC  12:56:35.40

    135.3 V
1A  INC  12:56:35.62

    137.3 V
1A  INC  12:56:35.79

    138.2 V
1A  DEC  12:56:38.50

    139.1 V  MAX
1A  NOR  12:56:38.51

    124.0 V
1A  DEC  12:56:38.51

    121.8 V
1A  DEC  12:56:38.53

    119.8 V
1A  DEC  12:56:38.61
```

COPYRIGHT © 1981, 1982, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

A voltage sag (fig. 2-4) in the NORMAL MODE is illustrated in the first printout below; the second printout shows voltage sag in the OUT-OF-LIMITS ONLY mode.

626

```
1A  NOR  12:17:48.61
    090.1 V MIN
    SAG 1.25 SEC

1A  LO   12:17:47.36


1A  NOR  12:17:48.61
    090.1 V MIN
    SAG 1.25 SEC

1A  INC  12:17:48.60
    103.1 V

1A  INC  12:17:48.55
    098.0 V

1A  INC  12:17:48.05
    096.0V

1A  INC  12:17:47.96
    094.0 V

1A  DEC  12:17:47.39
    091.9 V

1A  DEC  12:17:47.37
    094.1 V

1A  DEC  12:17:47:36
    101.3 V

1A  LO   12:17:47.36
```

```
1A  LO   12:17:47.36

    101.3 V
1A  DEC  12:17:47.36

    094.1 V
1A  DEC  12:17:47.37

    091.9 V
1A  DEC  12:17:47.39

    094.0 V
1A  INC  12:17:47.96

    096.0 V
1A  INC  12:17:48.05

    098.0 V
1A  INC  12:17:48.55

    103.1 V
1A  INC  12:17:48.60

    SAG 1.25 SEC
    090.1 V MIN
1A  NOR  12:17:48.61


1A  LO   12:17:47.36

    SAG 1.25 SEC
    090.1 V MIN
1A  NOR  12:17:48.61
```


COPYRIGHT © 1981, 1982, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

The following printout illustrates a printout of voltage sag (fig. 2-4) in the MAXIMUM DETAIL mode.

626

```
1A  INC  12:17:48.86
    112.1 V

1A  INC  12:17:48.69
    110.1 V

1A  INC  12:17:48.62
    108.1 V

1A  INC  12:17:48.61
    105.9 V

1A  NOR  12:17:48.61
    090.1 V MIN
    SAG  1.15 SEC

1A  INC  12:17:48.60
    103.1 V

1A  INC  12:17:48.55
    098.0 V

1A  INC  12:17:48.05
    096.0 V

1A  INC  12:17:47.96
    094.0V

1A  DEC  12:17:47.39
    091.9V

1A  DEC  12:17:47.37
    094.1 V

1A  DEC  12:17:47.36
    101.3 V

1A  LO   12:17:47.36

1A  DEC  12:17:47.35
    110.8 V

1A  INC  12:16:21.15
    113.0 V
```

626A

```
    113.0 V
1A  INC  12:16:21.15

    110.8 V
1A  DEC  12:17:47.35

1A  LO   12:17:47.36

    101.3 V
1A  DEC  12:17:47.36

    094.1 V
1A  DEC  12:17:47.37

    091.9 V
1A  DEC  12:17:47.39

    094.0 V
1A  INC  12:17:47.96

    096.0 V
1A  INC  12:17:48.05

    098.0 V
1A  INC  12:17:48.55

    103.1 V
1A  INC  12:17:48.60

    SAG  1.15 SEC
    090.1 V MIN
1A  NOR  12:17:48.61

    105.9 V
1A  INC  12:17:48.61

    108.1 V
1A  INC  12:17:48.62

    110.1 V
1A  INC  12:17:48.69

    112.1 V
1A  INC  12:17:48.86
```

COPYRIGHT © 1981, 1982, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

SECTION III
OPERATIONAL TEST

3.1 GENERAL

This section provides information for performing an operational test to verify that the 6009 plug-in is operating normally.

3.2 SYSTEM CHECK

When the PRINTOUT MODE switch is set to SYSTEM CHECK, a source of precise signals is applied to the front end circuitry of the 6009. Any inputs connected at this time will be automatically disconnected during the calibration period. Successful measurement of these calibration signals verifies that the module is fully operational. Expected measurement results and allowable tolerances are as follows:

AC Voltage	196.0-204.0 Volts
Impulse Peak	1800-2200 Volts
Impulse Duration	8-12 uSec
Frequency	399.0-401.0 Hz

(Note: If the frequency of AC voltage applied to the 6009 inputs is more than 410 Hz, an additional tolerance of ± the peak of the applied voltage may be added to the above expected impulse peak.)

The following is a typical system check printout.

626

```
******************

IMP- 2008V, 0009US
AC VOLTS    199.4V
      PH C
IMP- 2064V, 0010US
AC VOLTS    199.5V
      PH B
IMP- 2103V, 0009US
AC VOLTS    199.8V
      PH A
FRQ    400.5 HZ
   626-PA-6009
      CH 4

TIME = 00:00:18.20
***SYSTEM CHECK***
```

626A

```
***SYSTEM CHECK***
TIME = 00:00:18.20

      CH 4
   626-PA-6009
FRQ    400.5 HZ
      PH A
AC VOLTS    199.8V
IMP- 2103V, 0009US
      PH B
AC VOLTS    199.5V
IMP- 2064V, 0010US
      PH C
AC VOLTS    199.4V
IMP- 2008V, 0009US

******************
```

COPYRIGHT © 1981, 1982, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

WARNING

Because of possible shock or fire hazards, connection of this instrument should be performed in compliance with the National Electrical Code (ANSI C1) and/or any other requirements which may be applicable to the user.

Installation, operation, and maintenance should be performed only by qualified personnel.

TM-110280-3U

VOLUME I

OPERATOR'S MANUAL

626-PA-6011

EVENT TIME ACCUMULATOR

Note: Refer to Volume 2 (Service Manual) of TM-110280-3U for maintenance data.

1 May 1984
(Rev. 1 July 1984)
(Rev. 1 September 1985)
(Rev. 1 July 1986)

© COPYRIGHT 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. EDISON, NEW JERSEY.
ALL RIGHTS RESERVED.

DRANETZ

DRANETZ TECHNOLOGIES, INC.
1000 New Durham Rd., PO Box 4019
Edison, New Jersey 08818-4019

NOTICE REGARDING DRANETZ' PROPRIETARY RIGHTS

This publication contains information proprietary to Dranetz Technologies, Inc. By accepting and using this manual, the user agrees that the information contained herein will be used solely for the purpose of repairing or operating equipment of Dranetz Technologies, Inc. These manuals are to be returned to Dranetz Technologies, Inc. when no longer required by the user, or when there is a change in ownership of the equipment.

These publications are protected under the Copyright laws of the United States Title 17 et seq. No part of this publication may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language or computer language, in any form, by any means, electronic, mechanical, magnetic, optical, chemical, manual, or otherwise, without the expressed written consent of Dranetz Technologies, Incorporated, 1000 New Durham Road, PO Box 4019, Edison, New Jersey 08818-4019.

STATEMENT OF WARRANTY

ALL PRODUCTS OF DRANETZ TECHNOLOGIES, INC. ARE WARRANTED TO THE ORIGINAL PURCHASER AGAINST DEFECTIVE MATERIAL AND WORKMANSHIP FOR A PERIOD OF ONE YEAR FROM THE DATE OF DELIVERY. DRANETZ WILL REPAIR OR REPLACE, AT ITS OPTION, ALL DEFECTIVE EQUIPMENT RETURNED, FREIGHT PREPAID, DURING THE WARRANTY PERIOD, WITHOUT CHARGE FOR REPAIR, PROVIDED THERE IS NO EVIDENCE THAT THE EQUIPMENT HAS BEEN MIS-HANDLED OR ABUSED.

NOTE

The information in this manual has been reviewed and is believed to be entirely reliable. However, no responsibility is assumed for any inaccuracies. The material in this manual is for information purposes only, and is subject to change without notice.

TABLE OF CONTENTS

626-PA-6011 EVENT TIME ACCUMULATOR

VOLUME 1

Section			Page
I	GENERAL INFORMATION		
	1.1	Scope	1-1
	1.2	Introduction	1-1
	1.3	Purpose	1-1
	1.4	Equipment Characteristics	1-1
	1.5	Standard Accessories	1-3
	1.6	Optional Accessories	1-3
II	INSTALLATION AND OPERATION		
	2.1	Installation	2-1
	2.1.1	Load Ratings	2-1
	2.2	Connecting Input Channels	2-2
	2.2.1	Connection Procedure	2-2
	2.3	Operating the 6011	2-4
	2.3.1	Operational Description	2-4
	2.3.2	Operating Controls and Indicators	2-5
	2.4	Selecting the Factory/Option 101 Preset Program	2-7
	2.5	Description of Printouts	2-8
	2.6	Assembling Cables for 626-PA-6011	2-15
III	OPERATIONAL TEST		
	3.1	General	3-1
	3.2	System Check	3-1

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES INC. ALL RIGHTS RESERVED

LIST OF ILLUSTRATIONS

Figure		Page
2-1	Series 626 Controls Used by the 6011 Plug-In . . .	2-6
2-2A	Typical Programming Sequence - Model 626	2-10
2-2B	Typical Programming Sequence - Model 626A.	2-11
2-3	Event Data and Summary Mode Printouts.	2-12
2-4A	System Check, Program Summary and Data Summary Printouts - Model 626.	2-13
2-4B	System Check, Program Summary and Data Summary Printouts - Model 626A	2-14

LIST OF TABLES

Table		Page
1-1	626-PA-6011 Technical Specifications	1-2
2-1	6011 Operating Controls.	2-5

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES INC. ALL RIGHTS RESERVED

VOLUME 1
OPERATOR'S MANUAL

626-PA-6011 EVENT TIME ACCUMULATOR

SECTION I
GENERAL INFORMATION

1.1 SCOPE

This manual consists of two volumes. Volume 1, the Operator's manual, is divided into three sections: I) GENERAL INFORMATION, II) INSTALLATION AND OPERATION, and III) OPERATIONAL TEST. Volume 2, the Service manual, contains the maintenance instructions.

1.2 INTRODUCTION

This section provides operating instructions for the 626-PA-6011 Event Time Accumulator Plug-in, hereinafter referred to as the 6011. The 6011 is designed for installation in the Series 626 Universal Disturbance Analyzer. It is assumed that the reader is familiar with the mainframe information presented in Volume 1 of the mainframe manual.

1.3 PURPOSE

The 6011 monitors the state of up to 8 inputs. It senses, identifies and records, in a convenient alphanumeric printout, rapid state changes of such inputs as electro-mechanical or solid-state relays with a response time of 1 millisecond. The time between change of states is also recorded, and the total time spent in a given state is also accumulated. The 6011 provides highly accurate and reliable time sequence information, even from extremely noisy sources.

1.4 EQUIPMENT CHARACTERISTICS

The 6011 is configured as a plug-in module 6.5" high by 1.25" wide by 10" deep. It is designed for installation in any of the five slots of the Series 626. Technical specifications of the 6011 appear in Table 1-1.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES INC. ALL RIGHTS RESERVED

Table 1-1. 626-PA-6011 Technical Specifications

No. of Inputs	8
Input	
Impedance	2 wire differential 1 Megohm to ground (each side)
"On" State	2.30 Vdc Max.
"Off" State	1.80 Vdc Min.
Hysteresis	0.10 Vdc Min.
Max Input	±200 Vdc on an input
Min Response Time	1.2 mSec (min. resolution = 10 mSec)
Min. validation time	Program selectable*: 5, 10, 20, or 320 mSec
Normal polarity	Individual inputs selectable to be normally open (off) or normally closed (on)
Elapsed or accumulated time	Individual inputs selectable to accumulated time in Alarm or Normal
System Check	Temporarily disables externally applied inputs and causes all inputs to change states twice, checking input amplifiers, debounce filters, change of state logic and interrupt logic. Faulty inputs produce fault messages indicating faulty circuits.
Printout Modes	Printout
Normal	Channel No., input No., present state and time, plus accumulated time (where appropriate)
Maximum Detail	Same as NORMAL
Daily (Data) Summary	Channel No., input No., present state, number of transitions to A or N, total time accumulated in A or N
Short Term Summary	Same as daily summary except no present state
Program Summary	Channel No., module type, minimum (debounce) time, normal polarity state and elapsed time polarity
Preset	5 mSec debounce time, all inputs N/O, accumulated alarm time.

---

*Jumper selectable to 40, 80, 160, or 320 mSec.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES INC. ALL RIGHTS RESERVED

1.5 STANDARD ACCESSORIES

Model #	Part #	Quantity	Description
626-PA-6011 (Vol. 1)	TM-110280-3U	1	Operating Manual
	AMP 1-350352-9	8	Connector Housing
	AMP 640545-1	24	Connector Pin
	110289	1	Instruction Decal

1.6 OPTIONAL ACCESSORIES

Model #	Part #	Quantity	Description
626-PA-6011 (Vol. 2)	TM-110280-3U	1	Service (Maintenance) Manual

1.7 FACTORY REPAIR

When factory repair is required, proceed as follows:

1. Contact the Dranetz Service Corporation (formerly Dranetz Technologies Inc., Customer Service Department) in order to obtain an Authorization Number for factory repair.

   Telephone No: (201) 755-7081
   TWX: (710) 997-9553
   Telex: 499-7808
   Cable: DRANETZ

2. Fill out the REPAIR/SERVICE ORDER form enclosed in the Series 626 Operating Manual. Ship it along with the malfunctioning equipment to the Dranetz Service Corporation.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES INC. ALL RIGHTS RESERVED

SECTION II
INSTALLATION AND OPERATION

2.1 INSTALLATION

To install the 6011 in the mainframe, proceed as follows:

CAUTION

Be sure 626 is turned off and that all power connected to all plug-in modules is turned off.

a. Position the top and bottom front corners of the plug-in module in the upper and lower tracks at the desired slot position at the rear of the mainframe.

b. Carefully slide the module into the mainframe until it is firmly seated.

c. Tighten the top and bottom captive screws to secure the module to the mainframe.

2.1.1 Load Ratings

The Series 626 standard Mainframe has an upper limit of the total load rating of its installed modules. The overall Mainframe capacity is set at 20 Units. The individual modules have load ratings as follows:

Plug-in	Load Rating
626-PA-6001	2 Units
626-PA-6001 with Extra Option Board	3 Units
626-PA-6002	2 Units
626-PA-6003	4 Units
626-PA-6005	2 Units
626-PA-6006	2 Units
626-PA-6007	1 Unit
626-PA-6008	2 Units
626-PA-6009	4 Units
626-PA-6011	1 Unit
626-PA-6012	2 Units
626-PA-6012A	3 Units
626-PA-6013	2 Units
626-PA-6014	1 Unit
626-PA-6015	4 Units
626-PA-6018	4 Units
626-PA-6020	4 Units
626-PA-6024A	4 Units
626-PA-6024B	4 Units
626-PA-6030	6 Units

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES INC. ALL RIGHTS RESERVED

NOTE

When selecting modules for installation into any Series 626 Mainframe, verify that the sum of the load ratings of the installed modules DOES NOT exceed 20 Units.

2.2 CONNECTING INPUT CHANNELS

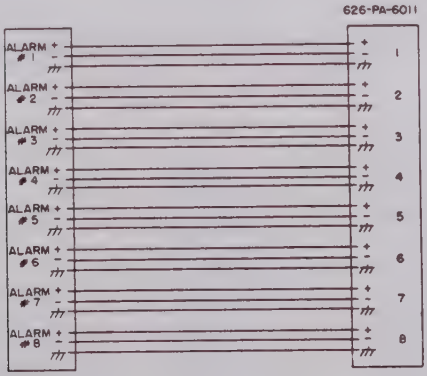
2.2.1 Connection Procedure

The 6011 is equipped with eight 3-pin connectors installed at the rear of the module. The input leads must be wired to the mating connectors supplied with the module, observing the polarity as marked on the rear panel. Attach each wired mating connector to the corresponding (1-8) rear panel connector.

CAUTION

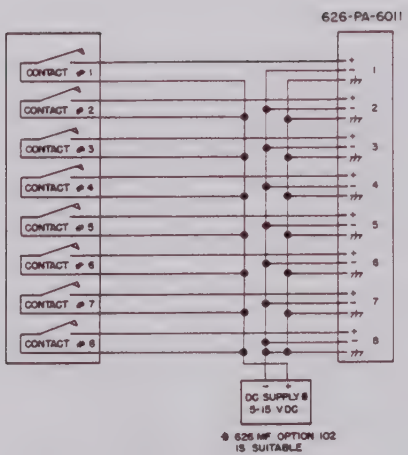
To avoid damaging the equipment, do not apply DC voltages in excess of 200V to the 6011.

2.2.2 Circuit Applications



Connection to Backplane Alarm Signals
(No Separate Contact Supply Required)

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES INC. ALL RIGHTS RESERVED



Connection to Relay Contacts
(Separate Contact Supply Required)

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES INC. ALL RIGHTS RESERVED

2.3 OPERATING THE 6011

2.3.1 Operational Description

The 6011 records and prints out any change of state of any of its eight inputs. Inputs can be programmed to be "normally closed" (or "high" or "on") or "normally open" (or "low" or "off") in accordance with the application. Minimum validation time is also program selectable to 5 mSec, 10 mSec or 320 mSec. Elapsed time is programmable to accumulate time spent in either the normal or alarm state. Both input state and validation parameters are stored in CMOS Random Access Memory so they are maintained when the 626 is turned off.

When any input changes state, the change data and alarm/normal status of all the inputs are stored, and the appropriate time accumulation action is taken. Depending on the printout mode selected, the channel number, alarm/normal status, and time of change and where appropriate, the time duration of the event are printed out. The number of transitions to the alarm state is also stored and printed out during data summary (along with present state). The total time spent in either the alarm or normal (programmed) state for that day, up until the printout time, is also printed. If a memory overflow occurs, only the transition count is updated. The transition count is stored in the short term accumulator and is printed out for those inputs that change state during the overflow condition when the overflow condition is cleared.

There are three input terminals: +, -, and GND. Since the maximum common mode voltage is ±200V DC, maximum inputs from ground are as follows:

positive input = 200 VDC, negative input = 197 VDC; or
positive input = -197 VDC, negative input = -200 VDC.

The inputs actually change state as follows:

ON = 2.30 VDC Max.
OFF = 1.80 VDC Min.
Hysteresis = 0.10 VDC Min.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES INC. ALL RIGHTS RESERVED

2.3.2 Operating Controls and Indicators

The functions of the mainframe operating controls and indicators associated with 6011 operation are described in Table 2-1. Figure 2-1 shows the typical front panel controls associated with the 6011. For a description of controls common to overall Series 625 operation, refer to Volume 1 of the mainframe manual.

Table 2-1. 6011 Operating Controls

Item	Function
F SENS pushbutton	Used in interactive program to change minimum validation time.
SENS pushbutton	Used in interactive program to change polarity of input states.
IMP SENS pushbutton	Used in interactive program to change the ETA (Elapsed Time Accumulated) mode of the inputs.
DATA pushbutton	When depressed, produces data summary printout.

2.3.3 Programming Procedure

Assume that it is desired to program the eight inputs of a 6011 as follows:

Minimum Validation Time: 10 mSec

Input	1	2	3	4	5	6	7	8
Polarity	1	0	1	0	0	0	0	0
ETA Mode	1	1	0	0	1	0	1	0

where the polarity code is defined as follows:

1 = N/C or on
0 = N/O or off

and the ETA mode is defined as:

1 = Elapsed time in Alarm state, and
0 = Elapsed time in Normal state.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES INC. ALL RIGHTS RESERVED

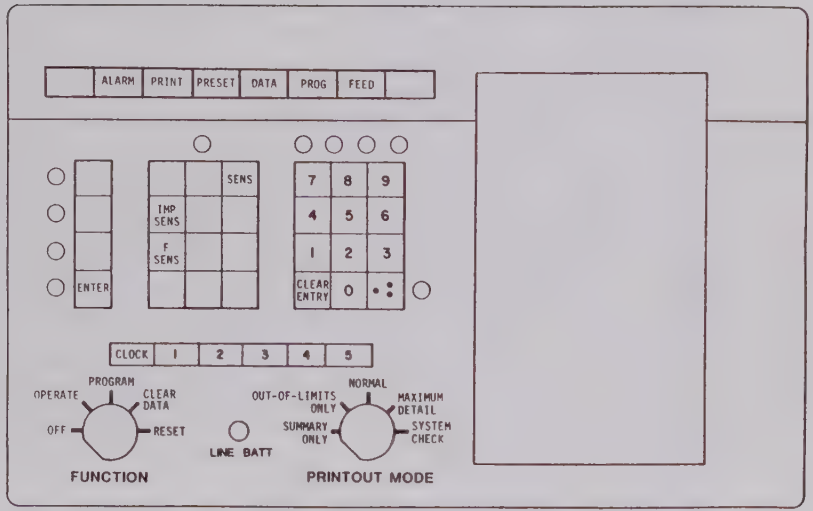


Figure 2-1. Series 626 Controls Used by the 6011 Plug-In

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES INC. ALL RIGHTS RESERVED

Program the 6011 as follows:

a. Set the FUNCTION switch to PROGRAM and depress the pushbutton (1-5) that corresponds to the slot position of the 6011 plug-in to be programmed. As shown in the typical printout of figure 2-2, a program summary is printed out, followed by prompt message #1. This message permits the operator to change minimum validation time, any or all input polarities, or any or all ETA modes.

b. To reprogram minimum validation time, press the F SENS pushbutton. This causes prompt message #2 to be generated. Now press "2". Note that program summary #2 is printed with minimum time updated to 10 mSec.

c. Prompt message #1 automatically follows the updated program summary. To change polarity, press the SENS pushbutton. This causes prompt message #3 to be generated. Enter the desired polarities: 1 0 1 0 0 0 0 0.

Note that program summary #3 is printed with both minimum validation time and polarity update.

d. Prompt message #1 again follows the program summary. To change the ETA modes, depress the IMP SENS pushbutton. This causes prompt message #4 to be generated. Enter the desired ETA modes:

1 1 0 0 1 0 1 0.

Note that program summary #4 is generated, with all three programmable parameters updated as desired. Another prompt #1 message is also generated, enabling further changes to be made, if desired.

2.4 SELECTING THE FACTORY/OPTION 101 PRESET PROGRAM

NOTE: Custom Preset Option 101 allows the user to choose his/her own program for the PRESET function.

To select the program stored in non-volatile memory, set the FUNCTION switch to PROGRAM and depress the channel number desired. The last operator-set program will be printed out. Now depress the PRESET pushbutton to recall the factory-set program. Unless specially modified to customer requirements, the factory-set program for the 6011 is as follows:

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES INC. ALL RIGHTS RESERVED

626*

```
TO CHANGE ETA MODE
PRESS:  'IMP SENS'
TO CHANGE POLARITY
PRESS:   'SENS'
TO CHANGE MIN TIME
PRESS:   'F SENS'

T 1 1 1 1 1 1 1 1
P 0 0 0 0 0 0 0 0
# 1 2 3 4 5 6 7 8

MIN TIME=005 MSEC

   626-PA-6011


TO CHANGE ETA MODE
PRESS:   'IMP SENS'
TO CHANGE POLARITY
PRESS:   'SENS'
TO CHANGE MIN TIME
PRESS:   'F SENS'

T 1 0 0 1 1 1 0 1
P 1 0 1 1 0 1 1 0
# 1 2 3 4 5 6 7 8

MIN TIME=020 MSEC

   626-PA-6011
       CH 4
PROGRAM SUMMARY

  PROGRAM MODE
```

626A*

```
  PROGRAM MODE

PROGRAM SUMMARY
       CH 4
   626-PA-6011

MIN TIME=020 MSEC

# 1 2 3 4 5 6 7 8
P 1 0 1 1 0 1 1 0
T 1 0 0 1 1 1 0 1

PRESS:   'F SENS'
TO CHANGE MIN TIME
PRESS    'SENS'
TO CHANGE POLARITY
PRESS:   'IMP SENS'
TO CHANGE ETA MODE


   626-PA-6011

MIN TIME=005 MSEC

# 1 2 3 4 5 6 7 8
P 0 0 0 0 0 0 0 0
T 1 1 1 1 1 1 1 1

PRESS:   'F SENS'
TO CHANGE MIN TIME
PRESS:   'SENS'
TO CHANGE POLARITY
PRESS:  'IMP SENS'
TO CHANGE ETA MODE
```

2.5 DESCRIPTION OF PRINTOUTS

With the plug-in module programmed and the FUNCTION switch set to OPERATE, a change of state detected in any of the eight inputs to the 6011 produces a printout. A sample printout appears in figure 2-3. This readout shows inputs that were programmed to measure accumulated time while in the alarm state. The first group shown is the Event Data Printout; the first three lines in this group constitute Event Printout #1. The second group of printouts is the Summary Mode. Each event in the event data printout occupies three lines. In event printout #1, input 6 of channel 1 changed to the alarm state at 20:48:30.41 and remained there until 20:48:34.55. The third line indicates that the

---

*If you are using a Model 626, read (from the bottom up) the "626" printouts in this manual; if using a Model 626A, read (from the top down) the "626" printouts instead.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES INC. ALL RIGHTS RESERVED

Elapsed Time (ET) in the Alarm (A) state was less than 0.1 minute. (Maximum time for the ET entry is 999.9 minutes.) Note that the Elapsed Time for input 6 appears as 0000.0 minutes in later printouts. This occurs if the inputs change at a rate faster than can be printed. In such cases, only the first elapsed time interval is shown (AET = < 0.1 MIN); the following ET printouts are set to 0000.0 MIN.

If the change state activity increases to a very high level, producing a memory overflow condition, the 6011 initiates a summary mode. The summary indicates the number of alarm transitions that occurred during the overflow interval. In this case, 19, 30, and 40 alarm "hits" were detected in inputs 6, 7, and 8, respectively. Note that for this summary, only those inputs that change are printed; no activity was detected in inputs 1 through 5 of this example.

When the PRINTOUT MODE switch is set to SYSTEM CHECK, board status is checked and a system check printout is produced. (See figure 2-4.) Refer to Section III of this manual for a description of the system check feature.

The 6011 cannot be calibrated if programmed to 320 mSec minimum validation time. Any error causes the board to be turned off until the error is corrected or the unit is reset. The DATA SUMMARY will display "BD OFF" as well as the usual message.

To obtain a program summary of the plug-ins installed in the Series 626, set the FUNCTION switch to OPERATE and depress the PROG pushbutton. The program summary for the 6011 is shown in figure 2-4. The summary shows the time, channel number, module type, programmed polarity, and ETA mode for each input.

The data summary is obtained by depressing the DATA pushbutton. For each input, the printout indicates the number of alarm transitions (if any) as well as the present state. (See figure 2-4.) The total time (TT) in the alarm state (or normal state, if so programmed) is also shown. (The maximum time possible for the TT printout is 1440 minutes (24 hours); this value is reset to 0000.0 at midnight.)

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES INC. ALL RIGHTS RESERVED

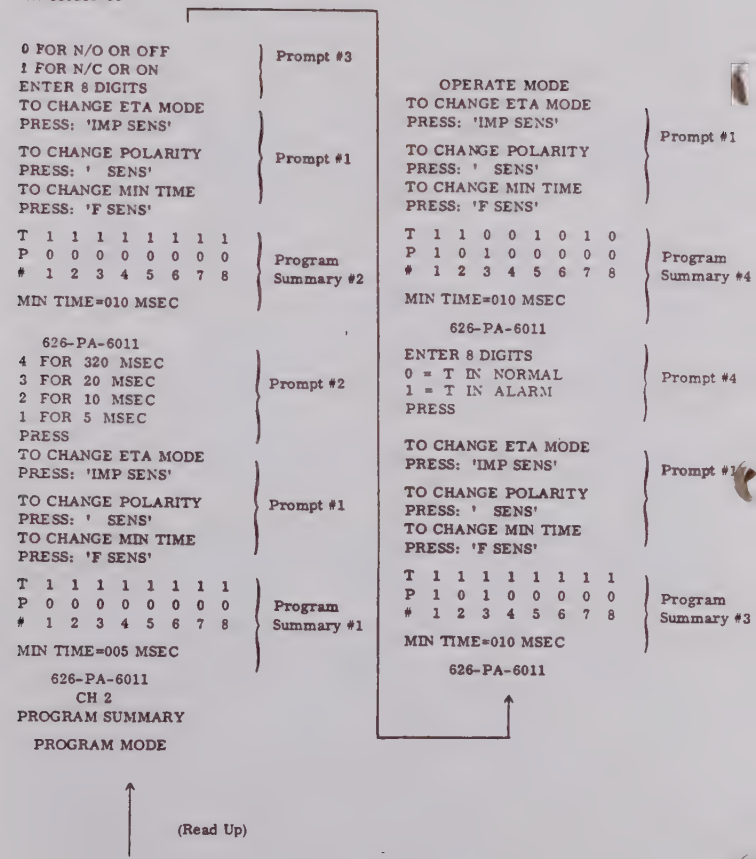


Figure 2-2A. Typical Programming Sequence - Model 626

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

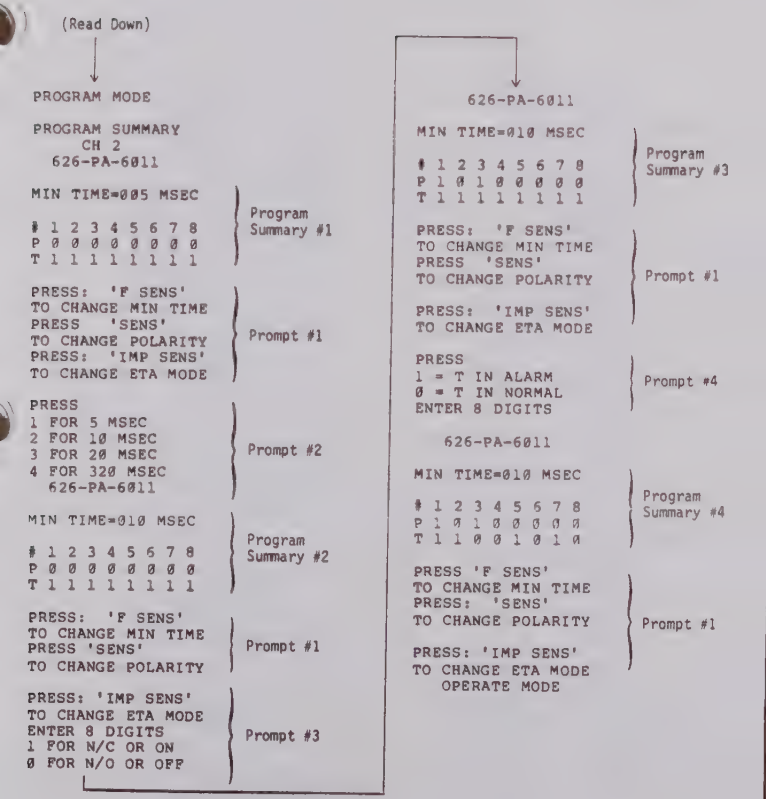


Figure 2-2B. Typical Programming Sequence - Model 626A

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES INC. ALL RIGHTS RESERVED

626

#8 0040 ALARM HIT
#7 0030 ALARM HIT
#6 0019 ALARM HIT

626-PA-6011
CH 2

SUMMARY MODE

AET = 000.0 MIN

1 #6 N 20:50:44.32
1 #6 A 20:50:44.30

AET = 000.0 MIN

1 #6 N 20:50:44.16
1 #6 A 20:50:44.13

AET = 000.0 MIN

1 #6 N 20:50:44.00
1 #6 A 20:50:43.96

AET = <0.1 MIN

1 #6 N 20:50:43.84
1 #6 A 20:50:43.79

AET = 0001.4 MIN

1 #6 N 20:50:33.67
1 #6 A 20:49:06.20

AET = <0.1 MIN

2 #1 N 19:36:28.52
2 #1 A 19:36:28.37

AET = 0000.2 MIN

1 #6 N 20:48:43.55
1 #6 A 20:48::30.41

626A

1 #6 A 20:48:30.41
1 #6 N 20:48:43.55

AET = 0000.2 MIN

2 #1 A 19:36:28.37
2 #1 N 19::36:28.52

AET = <0.1 MIN

1 #6 A 20:49:06.20
1 #6 N 20:50:33.67

AET = 0001.4 MIN

1 #6 A 20:50:43.79
1 #6 N 20:50:43.84

AET = <0.1 MIN

1 #6 A 20:50:43.96
1 #6 N 20:50:44.00

AET = 0000.0 MIN

1 #6 A 20:50:44.13
1 #6 N 20:50:44.16

AET = 0000.0 MIN

1 #6 A 20:50:44.30
1 #6 N 20:50:44.32

AET = 0000.0 MIN

SUMMARY MODE

CH 2
626-PA-6011

#6 0019 ALARM HIT
#7 0030 ALARM HIT
#8 0040 ALARM HIT

Figure 2-3. Event Data and Summary Mode Printouts

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES INC. ALL RIGHTS RESERVED

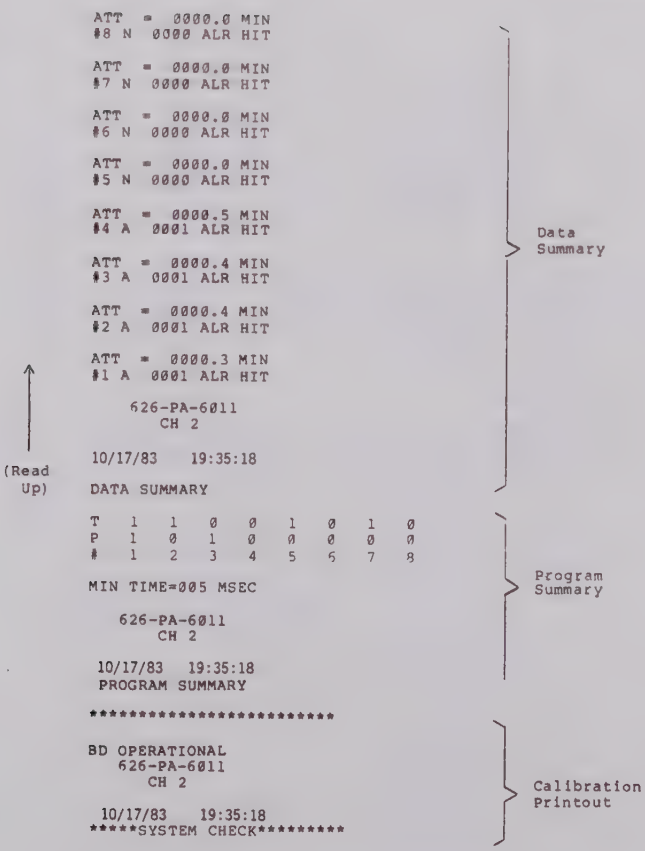


Figure 2-4A. System Check, Program Summary and Data Summary Printouts (Model 626)

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

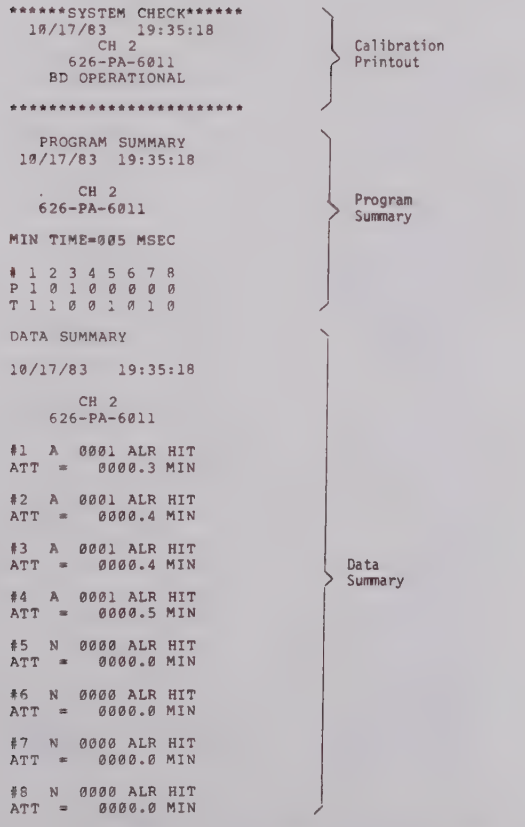


Figure 2-4B. System Check, Program Summary and Data Summary Printouts (Model 626A)

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES INC. ALL RIGHTS RESERVED

2.6 ASSEMBLING CABLES FOR 626-PA-6011

To attach the wires to the pins provided in the accessory bag for use with the 626-PA-6011, AMP tool #90325-1 is recommended. If this tool is not available, the following procedure may be used instead.

1) Take the three conductor twisted pair of red, green and black 24 AWG wires and untwist the 2 inches at one end.

2) Strip the insulation back 1/2" ± 1/16" and tin the wires.

3) Insert the wire into the pin until 1/8" of insulation is touching the pin (so edge of insulation is even with the first outer set of tabs). Bend these tabs tightly over the insulated wire, one at a time, with a needle-nose pliers.

4) Bend the inner tabs tightly over the stripped wire, one at a time, with a needle-nose pliers.

5) Apply a soldering iron to the inner tab. After heating for several seconds, apply a small amount of rosin core solder to the point of contact. Let flow for several seconds and remove soldering iron. Do not heat too long or the insulation may melt.

6) Repeat for the remaining 2 wires in the group.

7) When the pin has cooled, insert the pins into the connectors provided as follows, until a click is felt.

a. Red wire into hole marked #1.
b. Black wire into hole marked #2.
c. Green wire into hole marked #3.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES INC. ALL RIGHTS RESERVED

SECTION III
OPERATIONAL TEST

3.1 GENERAL

This section provides information for performing an operational test to verify that the 6009 plug-in is operating properly.

3.2 SYSTEM CHECK

When the PRINTOUT MODE switch is set to SYSTEM CHECK, board status is checked and a system check printout is produced. If the 6011 plug-in module is determined to be good, a system check printout such as that shown below is produced.

626

```
******************************

       BD OPERATIONAL
        626-PA-6011
           CH 2

    10/17/83   19:35:18
*******SYSTEM CHECK*********
```

626A

```
*******SYSTEM CHECK*********
    10/17/83   19:35:18

           CH 2
        626-PA-6011
       BD OPERATIONAL

******************************
```

If an abnormal condition is detected, the line BD OPERATIONAL may be replaced by one of the following:

INTERRUPT

INPUT ERROR

DATA ERROR

The 6011 cannot be calibrated if programmed to 320 mSec minimum validation time. Any error causes the board to be turned off until the error is corrected or the unit is reset. The DATA SUMMARY will display "BD OFF" as well as the usual message.

Note that the system check printout starts and ends with asterisks.

COPYRIGHT © 1981, 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES INC. ALL RIGHTS RESERVED

WARNING

Because of possible shock or fire hazards, connection of this instrument should be performed in compliance with the National Electric Code (ANSI C1) or any other requirements, or both, which may be applicable to the user.

Installation, operation, and maintenance should only be performed by qualified personnel.

TM-111900

VOLUME 1 -- OPERATOR'S MANUAL

626-PA-6012A

COMMUNICATIONS MODULE

15 June 1985

(Revised 4/1/86)

See opposite side relative to proprietary rights

Note: Refer to Volume 2 (Service Manual) TM-111900 for maintenance information.

© Copyright 1985, 1986
By Dranetz Technologies, Inc.
All Rights Reserved.

DRANETZ®
DRANETZ TECHNOLOGIES, INC.
1000 New Durham Rd., PO Box 4019
Edison, New Jersey 08818-4019

NOTICE REGARDING DRANETZ' PROPRIETARY RIGHTS

This publication contains information proprietary to Dranetz Technologies, Inc. By accepting and using this manual, the user agrees that the information contained herein will be used solely for the purpose of repairing or operating equipment of Dranetz Technologies, Inc. These manuals are to be returned to Dranetz Technologies, Inc. when no longer required by the user, or when there is a change in ownership of the equipment.

These publications are protected under the Copyright laws of the United States Title 17 et seq. No part of this publication may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language or computer language, in any form, by any means, electronic, mechanical, magnetic, optical, chemical, manual, or otherwise, without the prior written permission of Dranetz Technologies, Inc., 1000 New Durham Road, PO Box 4019, Edison, New Jersey 08818-4019.

Table of Contents (Page 1 of 3)

Section		Page
I	**GENERAL INFORMATION**	1-1
	Subsection	
	1.1 SCOPE	1-1
	1.2 INTRODUCTION	1-1
	1.3 APPLICATIONS AND PURPOSE	1-1
	1.4 PHYSICAL CONFIGURATION	1-2
	1.5 TECHNICAL SPECIFICATIONS	1-2
	1.6 FUNCTIONAL DESCRIPTION	1-12
	1.6.1 RS-232C Port Connections	1-12
	1.6.1.1 RS-232C Port Configurations	1-12
	1.6.2 Modem Port Connections	1-12
	1.6.2.1 Modem Port Communications	1-12
	1.6.2.2 Completion of the Modem Data Transmission	1-13
	1.6.2.3 Receiving an Incoming Call	1-13
	1.6.2.4 Prevention of Buffer Overflow	1-14
	1.6.2.5 Post-Call Link Establishment	1-14
	1.6.3 6012A Plug-In's CPU Communication	1-15
	1.6.4 6012A Plug-In's System Check Routine	1-15
	1.6.5 6012A Plug-In's Module Interface Software	1-15
	1.7 STANDARD ACCESSORIES	1-16
	1.8 OPTIONAL ACCESSORIES	1-16
	1.9 FACTORY REPAIR	1-16
II	**INSTALLATION AND OPERATION**	2-1
	Subsection	
	2.1 GENERAL	2-1
	2.2 LOAD RATINGS	2-1
	2.3 INSTALLATION	2-2
	2.3.1 Compliance with FCC Rules and Regulations	2-2
	2.3.1.1 Notification of the Telephone Company	2-2
	2.3.1.2 Connection to the Telephone Network	2-3
	2.3.1.3 Responsibilities of the Telephone Company	2-3
	2.3.1.4 In Case of Trouble	2-3
	2.3.1.5 Incidence of Harm	2-3
	2.3.1.6 Service	2-3

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

Table of Contents (Page 2 of 3)

Section	Subsection		Page
	2.3.2	Connecting the 6012A Plug-In	2-4
	2.4	OPERATING CONTROLS AND INDICATORS	2-5
	2.5	6012A PLUG-IN PROGRAMMING OPERATIONS AND FUNCTIONS	2-7
	2.5.1	Programming Procedure for the 6012A Plug-In	2-7
	2.5.1.1	Programming the Telephone Number (PHONE #)	2-8
	2.5.1.2	Programming the Transmit Mode (XMIT MODE)	2-10
	2.5.1.3	Programming the Station ID Number (STATION ID)	2-11
	2.5.1.4	Performing an Immediate Transmit of Data (TRANSMIT)	2-12
	2.5.1.5	Completion of the Programming	2-13
	2.5.2	Selecting the "Factory Preset" Program	2-14
	2.6	OPERATIONAL PRINTOUTS	2-15
	2.6.1	Operational Disturbance Printout	2-15
	2.6.2	Data Summary Printout	2-15
	2.6.3	Short-Term Accumulator's Printout	2-15
	2.7	EXAMPLE INSTALLATION	2-16
	2.7.1	Calling the 6012A Plug-In	2-16
	2.7.1.1	Dialing	2-16
	2.7.2	Log-On Procedure	2-17
	2.7.3	Receiving a Call from the 6012A Plug-In	2-17
	2.7.3.1	Call Reception	2-17
	2.7.3.2	Data Transmission	2-18
III	**OPERATIONAL TEST**		3-1
	3.1	GENERAL	3-1
	3.2	MINIMUM PERFORMANCE CHECK	3-1
	3.3	SUCCESSFUL COMPLETION OF THE SYSTEM CHECK	3-2
	3.4	UNSUCCESSFUL COMPLETION OF THE SYSTEM CHECK	3-2

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

Table of Contents (Page 3 of 3)

List of Illustrations

Figure		Page
2-1	Series 626 Controls used by the 6012A Plug-in	2-6

List of Tables

Table		Page
1-1	Technical Specifications	1-3
	I. MEMORY	1-3
	II. COMMUNICATIONS PORT (RS-232C COMM PORT)	1-3
	III. TELEPHONE PORT	1-3
	IV. MODEM	1-4
	V. CPU/INTERFACE BOARD	1-5
	VI. DATA TRANSMISSION PROCEDURE	1-6
	VII. PROGRAMMABLE FEATURES	1-9
	VIII. OPERATIONAL DISTURBANCE MESSAGES	1-10
	IX. REMOTE COMMAND SUMMARY	1-11
2-1	Load Ratings	2-1
2-2	6012A Plug-In Operating Controls	2-5

Copyright © 1985, 1986
By Dranetz Technologies, Inc.
All Rights Reserved.

STATEMENT OF WARRANTY

ALL PRODUCTS OF DRANETZ TECHNOLOGIES, INC. ARE WARRANTED TO THE ORIGINAL PURCHASER AGAINST DEFECTIVE MATERIAL AND WORKMANSHIP FOR A PERIOD OF ONE YEAR FROM THE DATE OF DELIVERY. DRANETZ WILL REPAIR OR REPLACE, AT ITS OPTION, ALL DEFECTIVE EQUIPMENT RETURNED, FREIGHT PREPAID, DURING THE WARRANTY PERIOD, WITHOUT CHARGE FOR REPAIR, PROVIDED THERE IS NO EVIDENCE THAT THE EQUIPMENT HAS BEEN MISHANDLED OR ABUSED.

The information in this manual has been reviewed and is believed to be entirely reliable. No responsibility, however, is assumed for any inaccuracies. The material in this manual is for information purposes only, and is subject to change without notice.

VOLUME 1
OPERATOR'S MANUAL

626-PA-6012A COMMUNICATIONS MODULE

SECTION I
GENERAL INFORMATION

1.1 SCOPE

This manual consists of two volumes. Volume 1, the Operator's manual, is divided into three sections: I) GENERAL INFORMATION, II) INSTALLATION AND OPERATION, and III) OPERATIONAL TEST. Volume 2, the Service manual, contains the maintenance instructions and consists of four sections, IV through VII. (See Volume 2 for a description of these sections.)

1.2 INTRODUCTION

This manual provides the installation and operating instructions for the 626-PA-6012A Communications Module plug-in, referred to as the 6012A plug-in. The 6012A plug-in is designed for installation into the Series 626 Universal Disturbance Analyzer Mainframe, referred to as the Series 626. Before reading these instructions, you should be familiar with the Mainframe information described in Volume 1 of the Mainframe manual.

1.3 APPLICATIONS AND PURPOSE

The 6012A plug-in is a bi-directional interface module used for remote operation of the Series 626 via telephone lines. It provides storage in its own stack memory for up to 960 disturbance events outputted from the Series 626 communications port. It then re-transmits the data to your terminal or printer, on demand, or at programmed time intervals, via its built-in, auto-answer/auto-dial modem. The 6012A plug-in also automatically answers incoming telephone calls for data requests.

After log-on, the 6012A plug-in transparently receives your commands via the telephone lines. It then passes your command directly to the Series 626, via the communications port interface, where it is processed. The output data is then immediately transmitted back to the 6012A plug-in, and then to you, through the telephone lines.

The 6012A plug-in may be programmed to immediately transmit upon the occurrence of any event, whenever an operator (on-site or remote) requests a transmission, on a periodic basis every X hours, or when memory is nearly full. A rear panel LED indicates data transmission activity.

Copyright © 1985, 1986
By Dranetz Technologies, Inc.
All Rights Reserved.

1.4 PHYSICAL CONFIGURATION

The 6012A plug-in is a single width module: 6½" high by 1¼" wide by 10" deep. It is designed for installation into any one of the five slots of the Series 626 Mainframe.

NOTE

It is preferable to use slot #1 to avoid entangling the signal input lines with the communications lines.

The 6012A plug-in is connected to the Series 626 RS-232C communications port via a 626/6012A interface cable (Dranetz Part # 110540). The 6012A plug-in is connected to a telephone line via a standard RJ-11C jack on its rear panel. A red LED on the rear panel lights whenever the telephone line is active (OFF-HOOK).

The module consists of three PC boards:

a. Board #1 is a CPU/Module interface board. It contains the 6012A plug-in's CPU, modem control, RS-232C interface, Series 626 module interface circuitry, and the stack memory (32K of CMOS RAM).

b. Board #2 contains additional modem interface circuitry.

c. Board #3 is an FCC registered, full duplex, 300-baud modem.

1.5 TECHNICAL SPECIFICATIONS

The technical specifications for the 6012A plug-in are listed in Table 1-1 which begins on the following page. The major sections of Table 1-1 are as follows:

		Page
I.	MEMORY	1-3
II.	COMMUNICATIONS PORT (RS-232 COMM PORT)	1-3
III.	TELEPHONE PORT	1-3
IV.	MODEM	1-4
V.	CPU/INTERFACE BOARD	1-5
VI.	DATA TRANSMISSION PROCEDURE	1-6
VII.	PROGRAMMABLE FEATURES	1-9
VIII.	OPERATIONAL DISTURBANCE MESSAGES	1-10

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

Table 1-1. Technical Specifications (page 1 of 9)

I. **MEMORY**

A. Size: 32 kilobytes max

B. Type: CMOS RAM

C. Allocation:

1. CPU: 1 kilobyte (Includes a 16-byte IRQ stack, and two 112-byte buffers for remote Receiver Mode buffering)

2. DATA STACK: 30 kilobytes

3. RE-TRANSMIT STACK: 1 kilobyte

D. Typical Event Capacity: 960 @ 32 characters/event

II. **COMMUNICATIONS PORT (RS-232C COMM PORT)**

A. Type: RS-232C compatible (DTE configuration)

B. Connection: To the Series 626 communications port via the interface cable (P/N 110540)

C. Baud Rate: Derived from the transmit/receive clock (pin 17) of the Series 626 communications port

D. Data Processing:

1. Received from the Series 626's communications port on an interrupt basis

2. Transmitted to the Series 626's communications port on a non-interrupt basis

III. **TELEPHONE PORT**

A. Type: Standard, -9dB permissive, 2-wire telephone line

B. Connection: Standard RJ-11C telephone jack

C. Status Indicator: Red LED on the rear panel lights whenever the port is active

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

Table 1-1. Technical Specifications (page 2 of 9)

IV. MODEM

A. Baud Rate: 0 to 300 asynchronous

B. Type: Bell 103 compatible, full duplex

C. Modulation: Binary, FSK

D. FCC Registration Number: DRJ6YR-70737-DM-N

E. Ringer Equivalence: 0.2B

F. Data Processing:

1. Received from the telephone line on a non-interrupt basis

2. Sent over the telephone line on an interrupt basis when the stack data is being transmitted; sent on a non-interrupt basis when in the Receiver Mode

G. Transmitter:

1. Transmit Frequency:

a. Originate: Mark: 1270 Hz ±1%
Space: 1070 Hz ±1%

b. Answer: Mark: 2225 Hz ±1%
Space: 2025 Hz ±1%

2. Receiver Level: -9dBm permissive

3. Clear to Send Delay:

a. Originate: 300 ±45 msec from CD

b. Answer: Coincidental with carrier detect

4. Answer Tone Timing: 2.56 ±0.5 sec

5. Soft Carrier Turn Off: 26.6 ±5 msec

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

Table 1-1. Technical Specifications (page 3 of 9)

H. Receiver:

1. Receive Frequency:

a. Originate: Mark: 2225 Hz ±1%
Space: 2025 Hz ±1%

b. Answer: Mark: 1270 Hz ±1%
Space: 1070 Hz ±1%

2. Receiver Sensitivity: -8dB to -45dB

3. Carrier Dropout: -45dB ±3dB

4. Carrier Detect Delay:

a. ON: 150 mSec ±30 msec

b. OFF: 50 mSec ±10 msec

5. Hysteresis: 2dB, min

V. CPU/INTERFACE BOARD

A. Processor Type: 6502

B. Power Consumption:

1. +12 V dc = 22 mA typical

2. -12 V dc = 12 mA typical

3. +5 V dc = 100 mA typical

C. Dialer Section:

1. Type: pulse

2. Rate: 10 pulses/second, max

3. Make/Break Ratio (Jumper Selectable):

a. 61% low, 39% high

b. 67% low, 33% high

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

Table 1-1. Technical Specifications (page 4 of 9)

4. Interdigit Timing (Jumper Selectable):

   a. 300 msec

   b. 800 msec

5. Digit Capacity: 16, including the WAIT-FOR-DIAL-TONE character

6. Maximum Wait Time for Dial Tone: 1.8 sec typical

7. Time to Dial: Depends on the telephone number and length

8. Maximum Retries if Call not Completed: 128

9. Wait Time Between Retries: 2 sec typical

10. Wait Time for Answer Back Tone (ABT) to Begin: 12 seconds

D. System Check Test:

1. Checks the memory size by writing to it and then reading back a series of test characters

2. Checks the RS-232C port control lines

3. Checks the modem by looping back the transmitter to the receiver, and writing and reading back a series of test characters

VI. DATA TRANSMISSION PROCEDURE

A. Call Initiation Procedure:

1. Enables DTR and Dial Enable

2. Waits max of 1.8 sec for dial tone

3. Dials digits

4. Upon completion of a successful dial, DSR turns on

5. 2-second billing time

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

Table 1-1. Technical Specifications (page 5 of 9)

6. 3-second Answer Back Tone (ABT)

7. RTS turns on, waits for CTS

8. Sends "STATION #XX" message before beginning the transmission of data

B. Block Length:

1. Length: 1024 characters

2. Time/Block: 40 sec typical

3. Output Format: 1 start bit, 7 bits ASCII data, even parity, and 2 stop bits

4. Overrun Character: $

C. Re-transmit Conditions:

1. Checks For:

a. Negative Acknowledge "^U" (NAK)

b. Positive Acknowledge "^F" (ACK)

c. End of Transmission "^D" (EOT)

2. Max Wait Time: 10 sec

3. Max Re-Transmit Requests: Infinite

D. Call Answering Procedure:

1. Enables DTR on detection of a ring

2. Waits 2 sec for the billing time

3. Turns RTS on

4. Checks for DSR to turn on (max 0.75 sec)

5. Waits for DCD to be activated (max 7 sec)

6. Checks for CTS and transmitter empty (max 1 sec)

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

Table 1-1. Technical Specifications (page 6 of 9)

7. Waits 1 sec and sends "?"

8. Waits for "IDXX": Where XX is the Station ID
   (max 16 sec)

NOTE

Failure of step 5, 6, or 8 results in a hang up (ON-HOOK). Failure of step 4 results in a "MODEM DEAD" message.

9. Waits 1 sec and sends "XX-READY" message

E. Call Termination Conditions:

1. If the modem fails to pass the System Check

2. When attempting to call out and there is no Answer Back Tone (ABT) within the specified time

3. If finished transmitting stack data and not in Receiver Suspended (Sends "EXE")

4. If the modem status is deemed inoperable

5. If in Receiver Mode and DSR falls, or DCD is gone for more than 2.5 sec

6. CPU massive failure

F. Data Transmission Protocol:

1. Comparable to ISO 1745 except:

   a. When in Receiver Mode, operates transparently full duplex--Series 424 protocol followed

   b. When in wait loop, if the timer times out, instead of re-transmitting the block, the next block of data is transmitted

2. Control characters sent out of the Series 424 for data transmission are suppressed and only inserted according to ISO 1745

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

Table 1-1. Technical Specifications (page 7 of 9)

3. Typical Transmission Format:

SOH/"STATION#xx"/STX/data (1k)/ETB/--wait time--/
STX/data/ETB/...../STX/ last block of data 'ETX/
"END OF XMIT"/--wait time--/"BYE"/DLE/EOT
(call terminated)

During wait time, looks for:

ACK: Positive Acknowledge
NAK: Negative Acknowledge
EOT: Terminate Call, End of Transmission

VII. PROGRAMMABLE FEATURES

A. Stack Memory Dump Modes:

1. NEVER --Holds all data regardless of the stack conditions

2. STACK FULL --Transmits data when only 200 free bytes of the stack remain

3. EVERY EVENT --Transmits each time any data goes into the stack

4. UPON REQUEST --Transmits only when given the proper command by the user while in the Program Mode, or from the remote location (Immediate Transmit Mode)

5. EVERY X HOURS --Transmits the stack data every X hours (where X is a value from 01 to 99)

6. EVERY X HOURS W/ STK FLL OPT --Every X hours with the Stack Full Option (same as 2 and 5)

B. Telephone Number:

1. Max of 16 digits, including the WAIT-FOR-DIAL-TONE character ("," Key)

C. Station ID:

1. Min # = 00

2. Max # = 99

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

Table 1-1. Technical Specifications (page 8 of 9)

D. Preset Values:

1. Transmit Mode: UPON REQUEST

2. Telephone Number: 238

3. Station ID: 00

VIII. OPERATIONAL DISTURBANCE MESSAGES

A. Possible Events:

1. PHONE LINE DEAD --Telephone line goes dead while the modem is active or an improper call termination procedure is used

2. RS-232C PORT DEAD --DSR or CTS bad, or transmitter or receiver will not clear

3. MODEM DEAD --Modem turned off due to a self-test failure during the System Check, or DSR fails, or the transmitter fails to empty when DCD and CTS are valid

4. OVFLW STK OVFLW --Overflow Stack overflowed--stack memory full, data possibly lost ($ char will show up in the dump)

5. MODEM BUSY --Transmitter busy--request for System Check but the modem is active so the test cannot be done

6. RAM MEM DEAD --CPU RAM massive failure--insufficient RAM to permit continued proper operation--6012A CPU is shut down

7. NO CALL-128 TRY --Cannot complete connection after 128 attempts, transmit request is cleared

8. RCV BUFFR OVFLW --Receiver buffer overflow--receiver buffer for remotely received characters is full

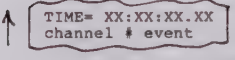
Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

Table 1-1. Technical Specifications (page 9 of 9)

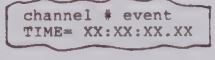
9. NO DIAL TONE	--During a telephone call attempt, if no dial tone is detected, the call sequence is terminated
10. DSR 626:OFF	--RS-232C port is inoperable due to the loss of DSR from the Series 626 communications port
11. DSR 626:ON	--RS-232C port is restored upon restoration of DSR from the Series 626 communications port
12. IRQ STK OVFLW	--IRQ stack overflowed--possible loss of "disturbance" data from the 6012A CPU to the module interface
13. PHONE CALL IN	--Modem received call (remote access via telephone lines)
14. PHONE CALL OUT	--Made a successful call out
15. PHONE CALL DONE	--Modem ends call (hangs up) following proper call termination procedure: sends "BYE" followed by DLE (Data Link Escape) and EOT (End of Transmission)

B. Format:

626*



626A*



C. Short Term Accumulator:

1. Summary Mode event printout is the same as above, except no time data is shown

IX. REMOTE COMMAND SUMMARY

Command	Description	Abbreviation	ASCII
Ctrl-D	Terminates connection	(EOT)	$04
Ctrl-U	Retransmits block	(NAK)	$15
Ctrl-F	Transmits next block	(ACK)	$06
¦	Dump stack command		$7C

* -If you are using a Model 626, read (from the bottom up) the "626" printouts in this manual; if you are using a Model 626A, read (from the top down) the "626A" printouts instead.

Copyright © 1985, 1986
By Dranetz Technologies, Inc.
All Rights Reserved.

1.6 FUNCTIONAL DESCRIPTION

The following subsections provide a functional description of the 6012A plug-in and its connection to the telephone lines.

1.6.1 RS-232C Port Connections

The 6012A plug-in's RS-232C compatible communications port, referred to as the COMM PORT, is connected to the Series 626's RS-232C communications port via an interface cable (P/N 110540).

1.6.1.1 RS-232C Port Configurations

The 6012A plug-in's COMM PORT is configured as a DTE (Data Terminal Equipment); the Series 626's port is a DCE (Data Communications Equipment). The 6012A plug-in monitors the DSR (Data-Set-Ready) and CTS (Clear-to-Send) lines from the Series 626. Any change of state of the DSR signal produces a disturbance printout. The CTS line is allowed to be "busy" (high) for up to 80 milliseconds. If it is "busy" for more than 80 milliseconds, it is flagged as an "RS-232C PORT DEAD" error.

The COMM PORT's baud rate is determined by the Xmit/Rcv Clk signal (pin 17) from the Series 626's communications port. Data sent to the 6012A plug-in is processed on an interrupt basis. It is stored in the RAM stack until it is re-transmitted or the memory is filled up. If any data is missed (e.g., the result of an overflow, or in the unlikely occurrence that the 6012A plug-in is not able to service the interrupt in time), a special character, "$", is stored in memory in place of the overrun character to indicate that data is missing.

1.6.2 Modem Port Connections

The 6012A plug-in interfaces to the public switched telephone network via an FCC registered modem. This connection is made via the RJ-11C (standard) PHONE JACK on the plug-in's rear panel using the supplied modular plug cable assembly (P/N 111919-G1).

1.6.2.1 Modem Port Communications

The 6012A plug-in calls the user-programmed telephone number after the Transmit Mode conditions have been met. The CPU instructs the modem to go OFF-HOOK and then checks for a dial tone. If it is not detected within three seconds, the modem goes back ON-HOOK and the "NO DIAL TONE" message is printed. If there is a dial tone, the telephone number is then dialed.

After dialing, the 6012A plug-in waits for the Answer Back Tone (ABT). If it is not detected within three seconds, the receiving end is either busy or not operating properly. In this case, the 6012A plug-in hangs up and then re-dials for up to 128 attempts. If the ABT is still not detected within these attempts, the message "NO CALL-128 TRIES" is printed; the call request is cleared until the user-programmed transmit condition re-occurs.

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

If the telephone call and handshaking (connection verification) are successfully completed, the message "STATION#XX" is printed; where XX is the user-programmed identification number. (If there are multiple units calling a single location, this identifies which unit is calling in.) The message "PHONE CALL OUT" is also printed. The data is then transmitted in 1K blocks, using 11 bit ASCII format, in comparable ISO (International Standards Organization) 1745, by an interrupt-driven routine to allow for maximum throughput.

1.6.2.2 Completion of the Modem Data Transmission

When a block of data is completed or the end of the data is reached, the 6012A plug-in waits for up to ten seconds while looking for a positive acknowledge character (ACK), a negative acknowledge character (NAK), or the end of transmission character (EOT).

If a NAK character is received, the last block of data is re-transmitted; the plug-in then returns to the 10-second wait loop. If an ACK character is received, the plug-in leaves the wait loop and the next block of data is transmitted; the plug-in then returns to the 10-second wait loop. If an EOT character is received, the call is immediately terminated; the message "PHONE CALL DONE" is printed. If no character is received and the wait loop times out, the next block of data is transmitted. The process continues until all of the data has been transmitted.

After the final wait time has expired, the 6012A plug-in sends an "END OF XMIT" message and "BYE" over the telephone lines, along with the DLE (Data-Link-Escape) and EOT control characters. The telephone line is then disconnected and the "busy" status is cleared. The message "PHONE CALL DONE" is printed.

If the telephone link is broken or disturbed for more than 50 milliseconds, at any time, the call will be terminated and "PHONE LINE DEAD" will be printed. If this occurs, only the character being transmitted when the communications break occurred is lost.

1.6.2.3 Receiving an Incoming Call

If a call is received by the 6012A plug-in, it first turns the DTR line on, putting the telephone OFF-HOOK. At the end of the ring, the DSR line is automatically turned on. It then waits the required two seconds for the billing time, turns the RTS line on, and then sends an ABT. The 6012A plug-in waits up to 2.5 seconds for a Carrier Detect (DCD) signal. Once the carrier is established, the 6012A plug-in sends a "?" and waits for up to 16 seconds looking for the sequence "IDXX"; where XX is the station identifier. If either the DCD or "IDXX" sequence is not received, the 6012A plug-in disconnects the telephone line. (This is done in order to deter unauthorized access to the unit by making it more difficult for someone [or something] to try to "guess" the access code.)

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

If the proper characters are received, the 6012A plug-in waits one second and then sends the message "XX-READY". This informs you that the system is ready to receive data. The 6012A plug-in is placed in the Receiver Mode (transparent to the remote user). All data received from the remote end is sent to the Series 626's RS-232C communications port via a 112-character buffer. Characters outputted by the Series 626 during this time are stored in the stack memory (as usual), and are also transmitted over the telephone line via another 112-character buffer.

1.6.2.4 Prevention of Buffer Overflow

If the Series 626's baud rate is greater than 300, the data will be transmitted to the 6012A plug-in faster than it can be sent out over the telephone line. This will cause the outgoing buffer to overflow. The unit will appear to lose characters when on-line; however, all of the characters are stored in the 6012A plug-in's main memory. (It is more difficult to overflow the incoming buffer since commands to the Series 626 are only single characters.)

NOTE

To prevent such overflow problems, set the baud rate of the Series 626 Mainframe to that of the 6012A plug-in (300 baud), if you intend to call up the unit and operate it remotely.

1.6.2.5 Post-Call Link Establishment

Once the link is established, the message "PHONE CALL IN" will be printed. If the carrier drops for more than 2.5 seconds, the 6012A plug-in terminates the call and prints "PHONE LINE DEAD". Similarly, when a call is properly terminated by an EOT character, "BYE" is sent over the telephone line and "PHONE CALL DONE" is printed. This gives you a hard-copy record of all of the telephone activity.

Only the special stack dump character, " " (ASCII $7C), is intercepted by the 6012A plug-in. If this character is received, a check is made to see if the unit is in the UPON REQUEST (Immediate Transmit) Mode. If not, a "NOGO" message is sent, followed by "BYE", the call is terminated, and "PHONE CALL DONE" is printed. (The purpose of this is to again deter unauthorized access to the data, for once the data is transmitted, it is cleared from memory.) If the unit is in the UPON REQUEST (Immediate Transmit) Mode, the Receiver Mode is suspended until all of the stack date is transmitted as described above. After completion of the stack dump, the 6012A plug-in returns to the transparent Receiver Mode.

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

1.6.3 6012A Plug-In's CPU Communication

The 6012A plug-in's CPU communicates to the module interface software via a mailbox technique. Either software program may request control of the common RAM, provided the other side doesn't already have control. Simultaneous requests are prevented by clock phasing. Once the request is granted, the RAM may be written to or read from. Data is passed between the 6012A plug-in's CPU and the module interface in this manner. To signal the other side that new data is there, or that certain data is requested, an IRQ line for each side may be set, and then cleared once the other side has acknowledged it. Since the CPU could generate interrupts faster than the module could process them, a 16-byte stack is used by the 6012A plug-in's CPU to send the interrupts whenever possible. Any error conditions, data status requests, or program parameter changes are exchanged in this manner.

1.6.4 6012A Plug-In's System Check Routine

The 6012A plug-in's System Check routine checks the memory, RS-232C port (COMM PORT), and the modem port (PHONE JACK) status. To determine the size of operational memory, memory is swapped out, page by page, and a series of test characters are written in, read back, and then compared. The status lines of the RS-232C port are then checked. The modem is checked by selecting a TEST line, which loops the output of the transmitter back to the receiver just behind the OFF-HOOK switch.

NOTE

The telephone line, telephone line interface, dialer circuitry, and OFF-HOOK switch are not tested during a System Check.

If the modem was previously turned off for any reason, a successful completion of the System Check routine will re-enable the modem. Any failure to successfully complete the System Check will result in the modem being disabled and a "MODEM DEAD" message being printed.

1.6.5 6012A Plug-In's Module Interface Software

The 6012A plug-in's module software interfaces to the Series 626 CPU. It controls the Opertional Disturbance, Program, and System Check printouts, as well as the program routine for the user-programmable parameters. It runs independently of the 6012A plug-in's CPU program, except when a conflict for control of the common RAM exists, or when it is waiting for a data response from the 6012A plug-in's CPU software. Other than a slight delay of the Power-On sequence, the 6012A plug-in's presence is not noticable during normal Series 626 operation.

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

1.7 STANDARD ACCESSORIES

Part #	Quantity	Description
TM-111900 Volume 1	1	Operator's manual
P/N 110540	1	626/6012A interface cable
P/N 111919-G1	1	25' (7.6m) telephone cord with RJ-11C jacks

1.8 OPTIONAL ACCESSORIES

Part #	Quantity	Description
TM-111900 Volume 2	1	Service (Maintenance) manual

1.9 FACTORY REPAIR

When factory repair is required, proceed as follows:

1. Contact the Dranetz Service Corporation (formerly Dranetz Technologies, Inc., Customer Service Department) in order to obtain an authorization number for factory repair.

   Telephone No: (201) 755-7081

   TWX: (710) 997-9553

   Telex: 499-7808

   Cable: DRANETZ

2. Fill out the REPAIR/SERVICE ORDER form enclosed in the Series 626 Operating manual. Ship it along with the malfunctioning equipment to the Dranetz Service Corporation.

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

SECTION II
INSTALLATION AND OPERATION

2.1 GENERAL

This section contains the installation, programming and operating instructions for the 6012A plug-in.

2.2 LOAD RATINGS

The Series 626 standard Mainframe has an upper limit of the combined total rating of its installed modules. The overall Mainframe capacity is set at 20 units. The individual modules (existing as of this printing) have the following load ratings:

Table 2-1. Load Ratings

Plug-in	Load Rating
626-PA-6001	2 Units
626-PA-6001 with extra option bd.	3 Units
626-PA-6002	2 Units
626-PA-6003	4 Units
626-PA-6005	2 Units
626-PA-6006	2 Units
626-PA-6007	1 Unit
626-PA-6008	2 Units
626-PA-6009	4 Units
626-PA-6011	1 Unit
626-PA-6012	2 Units
626-PA-6012A	3 Units
626-PA-6013	2 Units
626-PA-6014	1 Unit
626-PA-6015	4 Units
626-PA-6018	4 Units
626-PA-6020	4 Units

NOTE

When selecting modules for installation into any Series 626 Mainframe, verify that the sum of the load ratings of the installed modules DOES NOT exceed 20 Units.

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

2.3 INSTALLATION

To install the 6012A plug-in into the Mainframe, proceed as follows:

WARNING

Be sure that the Series 626 Mainframe and all of the power connected to its plug-in modules are first turned OFF before proceeding with any installation.

1. Position the top and bottom front corners of the plug-in module into the upper and lower tracks of the desired slot position at the rear of the Series 626 Mainframe. (It is preferable to use slot #1--the fifth slot from the left when facing the rear panel.)

2. Carefully slide the module into the Mainframe until it is firmly in position.

3. Tighten the top and bottom captive screws in order to secure the module to the Mainframe.

2.3.1 Compliance with FCC Rules and Regulations

The modem described in this manual has been approved by the FCC (Federal Communications Commission) for direct connection to the Public Switched Telephone Network. To comply with FCC regulations, you must be aware of certain procedures and considerations regarding the installation and operation of registered terminal equipment.

The following subsections (2.3.1.1 through 2.3.1.6) are paraphrased from a list of FCC Specifications, Part 68.

2.3.1.1 Notification of the Telephone Company

Before connecting to the telephone network, notify your telephone company of the line that you are using, the FCC Registration Number, the Ringer Equivalence of the modem, and the type of jack required for the connection. (This information appears on the rear panel of the 6012A plug-in, but is also stated below for convenience.) You must also notify your telephone company upon final disconnection of the equipment.

FCC Registration Number: DRJ6YR-70737-DM-N
Ringer Equivalence: 0.2B
Phone Jack (USOC): RJ-11C

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

2.3.1.2 Connection to the Telephone Network

All direct connection to the telephone network must be made through standard plugs and jacks as described in Part 68, Subpart F, of the FCC Rules. Connection to party lines and coin telephone service is prohibited.

After properly notifying the telephone company of your intended connection and installing the required jack, you may connect the modem by inserting the mating plug of the cable into the jack.

2.3.1.3 Responsibilities of the Telephone Company

The telephone company shall supply, upon request, the technical information required to permit compatibility with its facilities. To allow you the opportunity of maintaining uninterrupted service, the telephone company shall give you adequate notice of changes in its facilities and operations that may affect the use or performance of your equipment.

2.3.1.4 In Case of Trouble

If you experience operating trouble, disconnect the modem from the telephone line to determine if the equipment is malfunctioning. DO NOT use the modem until the problem is solved.

2.3.1.5 Incidence of Harm

If your modem causes harm to the telephone network, the telephone company shall, if feasible, notify you that service may be temporarily discontinued. If it becomes necessary to discontinue service immediately without prior notice, the telephone company shall promptly notify you and give you the opportunity to register a complaint to the Commission (FCC), pursuant to the procedures set forth in Part 68, Subpart E of the FCC Rules.

2.3.1.6 Service

All service and repairs must be performed by either Dranetz Technologies, Inc., or by the Dranetz Service Corporation. If unauthorized modification or repair is performed, both the FCC Registration and the manufacturer's warranty in effect will be null and void. If a malfunction is suspected, it is your responsibility to contact the Dranetz Service Corporation for further instructions.

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

2.3.2 Connecting the 6012A Plug-In

The 6012A plug-in has two connectors on its rear panel. One is for connection to the Series 626 Mainframe, and the other is for connection to the telephone lines. To connect the plug-in, proceed as follows:

1. Connect one end of the 626/6012A interface cable (P/N 110540) to the 6012A plug-in's COMM PORT, and the other end to the Series 626's communications port.

NOTE

FCC regulations require you to contact the telephone company before connecting this unit to a telephone line. This informs them of your intent to connect an FCC-Registered modem to the telephone lines. You must provide the telephone company with the Registration Number and Ringer Equivalence for the built-in modem. These numbers are located on the 6012A plug-in's rear panel.

2. Plug one end of the telephone cord (P/N 111919-G1) into the standard RJ-11C jack on the 6012A plug-in's rear panel (labeled "PHONE JACK"), and the other end into your telephone jack.

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

2.4 OPERATING CONTROLS AND INDICATORS

This subsection contains information on the Series 626's operating controls and indicators used by the 6012A plug-in.

The 6012A plug-in uses a menu-style format for selecting items. The functions of the Series 626's operating controls and indicators used by the 6012A plug-in are described in Table 2-2 below. Figure 2-1 on the following page illustrates the Series 626 controls used by the 6012A plug-in. For a description of the controls common to overall Series 626 operation, refer to Volume 1 of Series 626 Universal Disturbance Analyzer Operator's Manual.

Table 2-2. 6012A Plug-In Operating Controls

ITEM	FUNCTION
Numeric Keyboard*	Allows the selection of menu items
Numeric Keys	Used to enter numerical values for the various functions.
[DATA] push button	Produces a Data Summary printout when pressed.
[PROG] push button	Produces a Program Summary printout when pressed.
[PRESET] push button	With the FUNCTION key switch set at "PROGRAM", and a channel push button [1], [2], [3], [4], or [5] depressed, pressing [PRESET] recalls the "Factory Preset" program for that channel.
[ENTER] key	Transfers the numeric keyboard value into the 6012A plug-in's main memory when pressed.
[FNC] key	When pressed and then followed by a [1], [2], [3], or [4] key, the [FNC] key allows you to program the 1) telephone number, 2) transmit mode, 3) station ID, or 4) immediately transmit (respectively).
OTHER FRONT PANEL CONTROLS AND INDICATORS	Refer to Volume 1 of the Series 626 Mainframe Manual.

* -"Key" and "keyboard" represent the red, green, and yellow keys. "Push button" represents the black selector buttons.

Copyright © 1985, 1986
By Dranetz Technologies, Inc.
All Rights Reserved.

Figure 2-1. Series 626 Controls used by the 6012A Plug-in

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

2.5 6012A PLUG-IN PROGRAMMING OPERATIONS AND FUNCTIONS

The 6012A plug-in allows four programming operations and functions while in the Program Mode. They are:

1. Programming the Telephone Number (PHONE #).
2. Programming the Transmit Mode (XMIT MODE).
3. Programming the 2-Digit Station ID Number (STATION ID).
4. Performing an Immediate Transmit of the Data in the Stack Memory (TRANSMIT).

2.5.1 Programming Procedure for the 6012A Plug-In

(1) Turn on the Series 626. Turn the FUNCTION key from the "OPERATE" position to the "PROGRAM" position.

NOTE

A slight delay of the Series 626 Power-On sequence occurs with the 6012A plug-in installed. The length of the delay depends on the value and number of digits in the programmed telephone number.

a. A Program Summary for the currently selected channel will be immediately printed.*

(2) Press the channel push button (one through five) corresponding to the slot position of the 6012A plug-in.

a. The channel's Program Summary is immediately printed.

NOTE

The "Factory Preset" program may be recalled at any time during the Program Mode. (Refer to subsection 2.5.2 for more information on the PRESET function.)

b. The red LED above the center bank of keys lights, and the following is printed:

626

```
FNC4=TRANSMIT
FNC3=STATION ID
FNC2=XMIT MODE
FNC1=PHONE #
```

626A

```
FNC1=PHONE #
FNC2=XMIT MODE
FNC3=STATION ID
FNC4=TRANSMIT
```

* -If the chosen channel is empty, "CHANNEL EMPTY" is printed.

Copyright © 1985, 1986
By Dranetz Technologies, Inc.
All Rights Reserved.

NOTE

The parameters programmed under subsections 2.5.1.1 thru 2.5.1.4 do not have to be programmed in their given order. Use whatever order is appropriate for your specific situation when programming them.

2.5.1.1 **Programming the Telephone Number (PHONE #)**

a. The red LED above the center bank of keys should be lit.

(1) Press the red [FNC] key.*

(2) Press [1] to begin programming the telephone number.

a. Because FNC1=PHONE #. (See printout in subsection 2.5.1, step (2)b.)

b. The green LED next to the [ENTER] key lights, waiting for [ENTER] to be pressed.**

(3) Press [ENTER].

a. The green LED goes out and the following prompt message is printed:

626

```
MAX # = 16
WAIT-FOR-DIAL-TONE
IN PHONE #,INCLUDE
ENTER # OF DIGITS
```

626A

```
ENTER # OF DIGITS
IN PHONE #,INCLUDE
WAIT-FOR-DIAL-TONE
MAX # = 16
```

b. Two yellow LEDs light, indicating that the number of digits in the telephone number, including the WAIT-FOR-DIAL-TONE characters, must now be entered. (If there are less than 10 digits, a leading zero must be entered.)

---

* -Numbers and letters shown in brackets "[]" in this manual stand for the individual red, green, and yellow keys.

** -Pressing [CLEAR ENTRY] before [ENTER] will clear the current sequence of numeric keys which have been pressed.

Copyright © 1985, 1986
By Dranetz Technologies, Inc.
All Rights Reserved.

NOTE

If the PHONE STATUS is BAD ("PHONE BAD") or BUSY ("PHONE BUSY"), the above printout will not occur; the program sequence will return to the level of subsection 2.5.1, step (2)b. The telephone number cannot be changed if the PHONE STATUS is BAD or BUSY.

(4) Press the keys corresponding to the number of digits.

a. For Example: If you're dialing the telephone number **4 (wait-for-dial-tone) 555-1234**, you would press:

[0] [9]

because there are eight numeric digits and one wait-for-dial-tone digit in the telephone number.

(5) Press [ENTER].

a. The following prompt is printed indicating that the actual telephone number digits must now be entered:

b. A single yellow LED lights.

(6) Enter the telephone number digits using the yellow numeric keyboard.

a. For Example: If you're dialing the telephone number **4 (wait-for-dial-tone) 555-1234**, you would press:

[4], [•:], [5], [5], [5], [1], [2], [3], [4]

in this order ⟶

NOTE

Pressing [CLEAR ENTRY] at any point during the key entry sequence will return the programming sequence to the level of step (4) above.

b. After the specified number of digits have been entered, the yellow LED goes out; the green LED lights.

Copyright © 1985, 1986
By Dranetz Technologies, Inc.
All Rights Reserved.

(7) Press [ENTER].

a. The new telephone number is now transferred into CMOS RAM and loaded into the dialer. A Program Summary showing the new telephone number is then printed, and the programming sequence returns to the level of subsection 2.5.1, step (2)b.

2.5.1.2 **Programming the Transmit Mode (XMIT MODE)**

a. The red LED above the center bank of keys should be lit.

(1) Press [FNC].

a. A single yellow LED lights.

(2) Press [2].

a. Because FNC2=XMIT MODE.

b. The green LED lights.

(3) Press [ENTER].

a. The following list of Transmit Mode options is printed:

b. A single yellow LED lights, indicating that a digit, [0] through [5], must be pressed to enter your desired Transmit Mode.

(4) Press the key, [0] through [5], corresponding to the desired Transmit Mode.

a. If a [0] through [3] key is pressed, the programming sequence returns to the level of subsection 2.5.1, step (2)b without need for further entries, i.e., disregard step (5).

Copyright © 1985, 1986
By Dranetz Technologies, Inc.
All Rights Reserved.

(5) Enter the "hours" digits and press [ENTER]--if a [4] or [5] was previously pressed.

a. For Example: If your desired Transmit Mode is every eight hours, press [4] (because 4=EVERY X HOURS).

b. The green LED lights.

c. Press [ENTER].

d. The following is printed:

ENTER HOURS

e. Two yellow LEDs light, indicating that the hours between transmissions must now be entered. The entered value may range from 01 to 99 hours (leading zeroes must be entered).

f. Enter the "hours" digits: [0] [8].

g. The green LED lights.

h. Press [ENTER].

i. The new programming is now stored in CMOS RAM. A new Program Summary showing the new program values is printed. The programming sequence returns to the level of subsection 2.5.1, step (2)b.

2.5.1.3 **Programming the Station ID Number (STATION ID)**

a. The red LED above the center bank of keys should be lit.

(1) Press [FNC].

a. A single yellow LED lights.

(2) Press [3].

a. Because FNC3=STATION ID.

b. The green LED lights.

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

(3) Press [ENTER].

a. The following prompt is printed:

b. Two yellow LEDs light, indicating that the ID number, a value ranging from 00 to 99, must now be entered. (Leading zeroes must be entered.)

(4) Press the keys corresponding to the ID number.

a. For Example: To enter an ID number of 42, press the [4] and then [2] key.

(5) Press [ENTER].

a. The new ID number is stored in memory, an updated Program Summary is printed, and the programming sequence returns to the level of subsection 2.5.1, step (2)b.

2.5.1.4 **Performing an Immediate Transmit of Data (TRANSMIT)**

a. The Transmit Mode must be programmed to UPON REQUEST. Do this by repeating subsection 2.5.1.2 and selecting a [3] for the UPON REQUEST option of the Transmit Mode.

NOTE 1

If an Immediate Transmit is attempted while the Transmit Mode is not set to UPON REQUEST, the programming sequence will return immediately to the level of subsection 2.5.1, step (2)b.

NOTE 2

Changing the Transmit Mode clears any pending transmit requests (e.g., if the 6012A plug-in is trying to call but has not gotten through yet).

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

b. The red LED above the center bank of keys should be lit.

(1) Press [FNC].

a. A single yellow LED lights.

(2) Press [4].

a. The green LED lights.

(3) Press [ENTER].

a. The following prompt message is printed:

626

```
IMMEDIATE XMIT
PRESS: 1=YES 0=NO
```

626A

```
PRESS: 1=YES 0=NO
IMMEDIATE XMIT
```

(4) Press [0] and [ENTER] to abort; press [1] and [ENTER] to confirm YES.

a. The printout in step (3)a is a confirmation step to safeguard against accidental transmissions which would result in the loss of data. If a [0] is pressed, followed by [ENTER], the immediate transmission sequence is aborted and the programming sequence returns to the level of subsection 2.5.1, step (2)b. If a [1] is pressed, followed by [ENTER], the immediate transmission sequence is initiated and the following message is printed:

```
! IMMEDIATE XMIT
```

A Program Summary is printed and the programming sequence returns to the level of subsection 2.5.1, step (2)b.

2.5.1.5 Completion of the Programming

When the 6012A plug-in's programming is completed, you may proceed to program another module, by pressing another channel push button, or place the Series 626 on-line by turning the FUNCTION key to the "OPERATE" position.

While on-line, you may obtain the program currently in effect by simply pressing the black [PROG] push button.

Copyright © 1985, 1986
By Dranetz Technologies, Inc.
All Rights Reserved.

2.5.2 Selecting the "Factory Preset" Program

To select the "Factory Preset" program proceed as follows:

(1) Turn the FUNCTION key to the "PROGRAM" position.

a. A Program Summary for the currently selected channel will be immediately printed.*

(2) Press the channel push button (one through five) corresponding to the slot position of the 6012A plug-in.

a. The channel's Program Summary is immediately printed.

b. The red LED above the center keyboard lights, and the following is printed:

626

```
FNC4=TRANSMIT
FNC3=STATION ID
FNC2=XMIT MODE
FNC1=PHONE #
```

626A

```
FNC1=PHONE #
FNC2=XMIT MODE
FNC3=STATION ID
FNC4=TRANSMIT
```

(3) Ignore this printout and press the black [PRESET] push button.

a. This recalls the "Factory Preset" program from memory.

b. A Program Summary indicating the PRESET values is printed, and the programming sequence returns to the level of Subsection 2.5.1, step (2)b.

c. An example of the "Factory Preset" printout is as follows:

626

```
UPON REQUEST
XMIT MODE:
238
PHONE NUMBER:
STATION ID # 00
   626-PA-6012A
```

626A

```
   626-PA-6012A
STATION ID # 00
PHONE NUMBER:
238
XMIT MODE:
UPON REQUEST
```

NOTE

The "Factory Preset" program cannot be recalled while the PHONE STATUS is BAD or BUSY.

* -If the chosen channel is empty, "CHANNEL EMPTY" is printed.

Copyright © 1985, 1986
By Dranetz Technologies, Inc.
All Rights Reserved.

2.6 OPERATIONAL PRINTOUTS

This subsection contains information on obtaining an Operational Disturbance Printout, Data Summary Printout, and Short-Term Accumulator Printout.

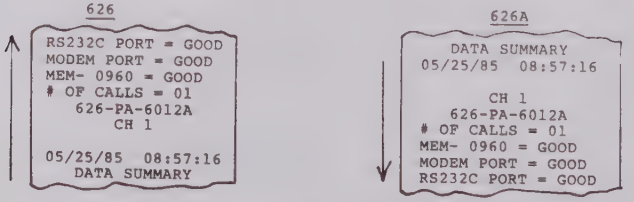
2.6.1 Operational Disturbance Printout

Any operational disturbances encountered by the 6012A plug-in are printed by the Series 626. These printouts are not affected by any of the various printout modes of the Series 626. The possible Operational Disturbance printouts are listed in Table 1-1, Roman Numeral VIII. A typical example is as follows:

2.6.2 Data Summary Printout

A Data Summary printout is requested by pressing the black [DATA] push button with the FUNCTION key in the "OPERATE" position. It will also be automatically printed each day at midnight (refer to TM-106650U for an explanation).

The Data Summary printout serves as a status check for the 6012A plug-in. The following is an example of a typical Data Summary printout:



2.6.3 Short-Term Accumulator's Printout

If disturbances occur at a faster rate than the Series 626 is capable of processing and printing, and if the Series 626's internal event stack memory overflows, then any subsequent events are stored in the Short-Term Accumulator (in summary form) until the overflow condition is cleared.

Copyright © 1985, 1986
By Dranetz Technologies, Inc.
All Rights Reserved.

NOTE 1

The overflow problem may be avoided to some extent by setting the Series 626's baud rate to 9600 and turning off its printer. The 6012A plug-in will then collect up to 960 disturbance events.

NOTE 2

If the Series 626 is turned off, all of the disturbance data being held in the Series 626 and 6012A plug-in's memory is cleared.

These values are automatically cleared after the printout of the Short-Term Accumulator is completed. The event format is identical to the Operational Disturbance Printout, with the exception that no time information is printed. An example of a typical Short-Term Accumulator's printout is as follows:

2.7 EXAMPLE INSTALLATION

This subsection contains application information and describes a typical installation using, as an example, a UDS Model 103LP Modem at the user's end to communicate with a remote 6012A plug-in.

2.7.1 Calling the 6012A Plug-In

The following procedure "calls up" the 6012A plug-in.

2.7.1.1 Dialing

(1) Set the TTY or CRT to 300 baud.

(2) Connect the TTY or CRT to the modem's rear panel connector.

(3) Connect the telephone to the TELSET jack on the modem's rear panel, and the phone line to the TELCO jack.

(4) Set the modem's front panel switch to the "TALK" position, and the rear panel switch to the "ORIGINATE" position.

(5) Lift the telephone OFF-HOOK and dial the 6012A plug-in's telephone number.

Copyright © 1985, 1986
By Dranetz Technologies, Inc.
All Rights Reserved.

2.7.2 Log-On Procedure

(1) After the ringing stops (usually after 1 ring), listen for the Answer Back Tone (ABT); it should occur after the 2-second Billing Delay.

(2) Within 4 seconds of hearing the tone, set the modem's front panel switch to the "DATA" position.

(3) A "?" should appear after approximately 1 second; you now have 15 seconds to enter "IDXX": where XX is the Station ID number assigned to that particular 6012A plug-in.

NOTE

When attempting to access the 6012A plug-in from a remote location:

After successfully completing the log-on procedure (unit has responded with the "IDXX" message), if the memory is full, attempting to perform any operation other than a data dump of the 6012A plug-in, results in a "MEMORY FULL (¦)" message printed at the remote terminal. After the data is dumped and the RS-232C COMM PORT to the Series 626 is restored, all operations are again permitted.

(4) If the above steps are all properly executed, the 6012A plug-in will send "XX-READY"." At this time the data link is established. After placing the Series 626 in the Remote Mode, your TTY will operate as if it is directly connected to the Series 626's communications port. (Refer to TM-106650U for more information regarding the operation of the Series 626 from a remote terminal.

(5) Refer to subsection 1.6 for more information regarding the Data Transmission procedures of the 6012A plug-in.

2.7.3 Receiving a Call from the 6012A Plug-In

2.7.3.1 Call Reception

(1) Set the TTY or CRT to 300 baud.

(2) Connect the TTY or CRT to the modem's rear panel connector.

(3) Connect the telephone to the modem's rear panel TELSET jack, and the telephone line to the TELCO jack.

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

(4) Set the modem's front panel switch to the "TALK" position, and the rear panel switch to the "ANSWER" position.

(5) When the telephone rings, lift it OFF-HOOK and set the modem's front panel switch to the "DATA" position.

(6) After a 2-second pause, the 6012A plug-in will send the "STATION#XX" identification message and begin transmitting data.

2.7.3.2 Data Transmission

This subsection briefly describes the Data Transmission procedure used by the 6012A plug-in. (For a more detailed description of the Data Transmission procedure, refer to subsections 1.6 through 1.6.5.)

(1) After the first 1K block (or partial block) of data is transmitted, the 6012A plug-in will wait for 10 seconds for:

a. Positive Acknowledge--ACK
(^F)-to terminate wait time.

b. Negative Acknowledge--NAK
(^U)-to re-transmit the block of data.

c. End of Transmission--EOT
(^D)-to terminate call.

If an ACK, NAK, or EOT is received by the 6012A plug-in, the proper action is immediately taken. If the 10-second wait time expires, the next block of data is then transmitted.

(2) When the last block of data has been sent, an "END OF XMIT" message is sent followed by a 10-second wait (for ACK, NAK, or EOT).

(3) If no re-transmission is requested, then the 6012A plug-in will send a "BYE" message and terminate the call.

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

SECTION III
OPERATIONAL TEST

3.1 GENERAL

This section describes the procedure used for verifying the 6012A plug-in's operation.

3.2 MINIMUM PERFORMANCE CHECK

A System Check of the 6012A plug-in tests nearly all of its circuitry (memory, RS-232C port, and modem port status) and verifies that it is operating properly. To perform the System Check routine:

(1) Turn the PRINTOUT MODE key momentarily to the "SYSTEM CHECK" position, and then back to "NORMAL".

NOTE

On some older models of the Series 626's front panel, "SYSTEM CHECK" may instead read "CALIBRATE".

a. The following is performed:

First
To determine the size of the operational (RAM) memory, memory is swapped out, page by page, and a series of test characters are written in, read back, and then compared.

Second
The modem is checked by selecting a TEST line which "loops" the output of the modem transmitter back to the modem receiver just behind the OFF-HOOK switch. Another series of test characters are sent out, and then read back in. This is done to check for proper operation of the modem; however, it DOES NOT check for proper operation of the telephone line, telephone line interface, OFF-HOOK switch, or dialer circuitry.

If the modem was previously turned off for any reason, a successful completion of the System Check routine re-enables the modem. Any failure to successfully complete the System Check results in the modem being disabled and a "MODEM DEAD" message being printed.

Third
The status lines of the 6012A Plug-in's COMM PORT are checked for proper signal levels (status).

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

These procedures effectively test nearly all of the 6012A plug-in's circuitry (with the exception of the telephone line, telephone line interface, OFF-HOOK switch, and dialer circuitry).

3.3 SUCCESSFUL COMPLETION OF THE SYSTEM CHECK

Successful completion of the System Check results in a printout such as the following:

626

```
**********

RS232C PORT = GOOD
MODEM PORT = GOOD
MEM- 0960 = GOOD

   626-PA-6012A
       CH 1

05/25/85  08:56:16
***SYSTEM CHECK***
```

626A

```
***SYSTEM CHECK***
05/25/85  08:56:16

       CH 1
  626-PA-6012A

MEM- 0960 = GOOD
MODEM PORT = GOOD
RS232C PORT = GOOD

**********
```

3.4 UNSUCCESSFUL COMPLETION OF THE SYSTEM CHECK

If your printout from the System Check routine does not read "GOOD" for all three readings, or if a "MODEM DEAD" message is printed during the System Check, contact the Dranetz Service Corporation for further instructions (see subsection 1.9).

Copyright © 1985, 1986
By Dranetz Technologies, Inc.
All Rights Reserved.

WARNING

Because of possible shock or fire hazards, connection of this instrument should be performed in compliance with the National Electric Code (ANSI C1) or any other requirements, or both, which may be applicable to the user.

Installation, operation, and maintenance should only be performed by qualified personnel.

TM-111916

VOLUME 1 -- OPERATOR'S MANUAL

626-PA-6013

MASS STORAGE MODULE

1 August 1985

(Revised 4/1/86)

See opposite side relative to proprietary rights

Note: Refer to Volume 2 (Service Manual) TM-111916 for maintenance information.

© Copyright 1985, 1986
By Dranetz Technologies, Inc.
All Rights Reserved.

DRANETZ® DRANETZ TECHNOLOGIES, INC.
1000 New Durham Rd., PO Box 4019
Edison, New Jersey 08818-4019

NOTICE REGARDING DRANETZ' PROPRIETARY RIGHTS

This publication contains information proprietary to Dranetz Technologies, Inc. By accepting and using this manual, the user agrees that the information contained herein will be used solely for the purpose of repairing or operating equipment of Dranetz Technologies, Inc. These manuals are to be returned to Dranetz Technologies, Inc. when no longer required by the user, or when there is a change in ownership of the equipment.

These publications are protected under the Copyright laws of the United States Title 17 et seq. No part of this publication may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language or computer language, in any form, by any means, electronic, mechanical, magnetic, optical, chemical, manual, or otherwise, without the prior written permission of Dranetz Technologies, Inc., 1000 New Durham Road, PO Box 4019, Edison, New Jersey 08818-4019.

Table of Contents (Page 1 of 3)

Section		Page
I	**GENERAL INFORMATION**	1-1
	Subsection	
	1.1 SCOPE	1-1
	1.2 INTRODUCTION	1-1
	1.3 APPLICATIONS AND PURPOSE	1-1
	1.4 PHYSICAL CONFIGURATION	1-2
	1.5 TECHNICAL SPECIFICATIONS	1-2
	1.6 FUNCTIONAL DESCRIPTION	1-8
	1.6.1 RS-232C COMM PORT Connections	1-8
	1.6.1.1 RS-232C COMM PORT Configurations	1-8
	1.6.2 DATA PORT Connections	1-8
	1.6.2.1 DATA PORT Connecting Pin Diagrams	1-8
	1.6.2.2 DATA PORT Communications	1-10
	1.6.3 Data Transmission Sequence	1-10
	1.6.4 Communication Requests	1-11
	1.6.4.1 Communication	1-11
	1.6.5 Stack Dump	1-12
	1.6.6 6013 Plug-In's CPU Communication	1-12
	1.6.7 6013 Plug-In's SYSTEM CHECK Routine	1-13
	1.6.8 6013 Plug-In's Module Interface Software	1-13
	1.7 STANDARD ACCESSORIES	1-13
	1.8 OPTIONAL ACCESSORIES	1-13
	1.9 FACTORY REPAIR	1-14
II	**INSTALLATION AND OPERATION**	2-1
	Subsection	
	2.1 GENERAL	2-1
	2.2 LOAD RATINGS	2-1
	2.3 INSTALLATION	2-2
	2.3.1 Connecting the 6013 Plug-In	2-3
	2.4 OPERATING THE 6013 PLUG-IN	2-3
	2.4.1 Operating Controls and Indicators	2-3

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

Table of Contents (Page 2 of 3)

Section — Page

Subsection

2.5 6013 PLUG-IN PROGRAMMING OPERATIONS AND FUNCTIONS 2-6
2.5.1 Programming Procedure for the 6013 Plug-In 2-6
2.5.1.1 Programming the Baud Rate 2-7
2.5.1.2 Programming the TRANSMIT MODE (XMIT MODE) 2-8
2.5.1.3 Programming the Station ID Number (ID #) 2-9
2.5.1.4 Performing an Immediate Data Transmission (XMIT) 2-10
2.5.1.5 Clearing the 6013 Plug-In's Memory 2-11
2.5.1.6 Completion of the Programming 2-12
2.5.2 Selecting the "Factory Preset" Program..... 2-12

2.6 OPERATIONAL PRINTOUTS 2-13
2.6.1 Operational Disturbance Printout 2-13
2.6.2 Data Summary Printout 2-14
2.6.3 Short-Term Accumulator's Printout 2-14

2.7 REMOTE LOG-ON PROCEDURE 2-15
2.7.1 Memory Full Condition 2-16

III **OPERATIONAL TEST** 3-1

Subsection

3.1 GENERAL 3-1

3.2 MINIMUM PERFORMANCE CHECK 3-1

3.3 SUCCESSFUL COMPLETION OF THE SYSTEM CHECK 3-2

3.4 UNSUCCESSFUL COMPLETION OF THE SYSTEM CHECK 3-2

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

Table of Contents (Page 3 of 3)

List of Illustrations

Figure		Page
2-1	Series 626 Controls used by the 6013 Plug-in	2-5

List of Tables

Table		Page
1-1	Technical Specifications	1-3
	I. MEMORY	1-3
	II. COMM PORT (RS-232C COMMUNICATIONS PORT)	1-3
	III. DATA PORT	1-3
	IV. PROGRAMMABLE FEATURES	1-5
	V. OPERATIONAL DISTURBANCE MESSAGES	1-6
	VI. REMOTE COMMAND SUMMARY	1-7
2-1	Load Ratings	2-1
2-2	6013 Plug-In Operating Controls	2-4

Copyright © 1985, 1986
By Dranetz Technologies, Inc.
All Rights Reserved.

STATEMENT OF WARRANTY

ALL PRODUCTS OF DRANETZ TECHNOLOGIES, INC. ARE WARRANTED TO THE ORIGINAL PURCHASER AGAINST DEFECTIVE MATERIAL AND WORKMANSHIP FOR A PERIOD OF ONE YEAR FROM THE DATE OF DELIVERY. DRANETZ WILL REPAIR OR REPLACE, AT ITS OPTION, ALL DEFECTIVE EQUIPMENT RETURNED, FREIGHT PREPAID, DURING THE WARRANTY PERIOD, WITHOUT CHARGE FOR REPAIR, PROVIDED THERE IS NO EVIDENCE THAT THE EQUIPMENT HAS BEEN MISHANDLED OR ABUSED.

The information in this manual has been reviewed and is believed to be entirely reliable. No responsibility, however, is assumed for any inaccuracies. The material in this manual is for information purposes only, and is subject to change without notice.

VOLUME 1
OPERATOR'S MANUAL

626-PA-6013 MASS STORAGE MODULE

SECTION I
GENERAL INFORMATION

1.1 SCOPE

This manual consists of two volumes. Volume 1, the Operator's manual, is divided into three sections: I) GENERAL INFORMATION, II) INSTALLATION AND OPERATION, and III) OPERATIONAL TEST. Volume 2, the Service manual, contains the maintenance instructions and consists of four sections, IV through VII. (See Volume 2 for a description of these sections.)

1.2 INTRODUCTION

This manual provides the installation and operating instructions for the 626-PA-6013 Mass Storage Plug-In Module, referred to as the 6013 plug-in. The 6013 plug-in is designed for installation into the Series 626 Universal Disturbance Analyzer Mainframe, referred to as the Series 626 or Mainframe. Before reading these instructions, you should be familiar with the Mainframe information described in Volume 1 of the Mainframe manual.

1.3 APPLICATIONS AND PURPOSE

The 6013 plug-in provides bi-directional interfacing for remote operation of the Series 626 via the RS-232C DATA PORT. It also provides storage in its own stack memory (with battery backup) for up to 960 disturbance events outputted from the Series 626 COMMUNICATIONS PORT. It then re-transmits the data to your terminal, printer, or, via an external modem, to another site. Transmission may be on-demand or at programmed time intervals.

After log-on, the plug-in transparently receives your commands via the RS-232C interface cable to its DATA PORT. It then passes your command from its COMM PORT, through the 626/6013 interface cable, into the Series 626's COMMUNICATIONS PORT to the Mainframe, where it is then processed. Output data are then sent back to the plug-in, and then to you, via the DATA PORT.

The 6013 plug-in may be programmed to transmit whenever an operator (on-site or remote) requests a transmission, immediately upon the occurrence of a disturbance event, on a periodic basis every X hours, or when memory is nearly full. Because the plug-in possesses a non-volatile memory, simply turning off the Series 626 will not erase its memory (unless its batteries become depleted or disconnected). A rear panel LED lights whenever there is data transmission activity.

Copyright © 1985, 1986
By Dranetz Technologies, Inc.
All Rights Reserved.

1.4 PHYSICAL CONFIGURATION

The 6013 plug-in is a single width module: 6¼" high by 1¼" wide by 10" deep. It is designed for installation into any one of the five slots of the Series 626 Mainframe.

NOTE

It is preferable to use slot #1 to avoid entangling the signal input lines with the communications lines.

The 6013 plug-in's RS-232C COMM PORT is connected to the Series 626's RS-232C COMMUNICATIONS PORT via a 626/6013 interface cable (Dranetz P/N 110540).

The module consists of two PC boards:

1) The primary board is the CPU/module interface board. It contains the RS-232C interface circuits of the DATA and COMM PORTS (including the D-connectors), "Ring" circuit, Series 626 module interface circuitry, and the stack memory (up to 32K of CMOS RAM).

2) The secondary board contains the battery back-up circuitry.

1.5 TECHNICAL SPECIFICATIONS

The technical specifications for the 6013 plug-in are listed in Table 1-1 which begins on the following page. The major sections of Table 1-1 are as follows:

	Page
I. MEMORY	1-3
II. COMM PORT (RS-232C COMMUNICATIONS PORT)	1-3
III. DATA PORT	1-3
IV. PROGRAMMABLE FEATURES	1-5
V. OPERATIONAL DISTURBANCE MESSAGES	1-6

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

Table 1-1. Technical Specifications (page 1 of 5)

I. MEMORY

A. Size: 32 kilobytes, max

B. Type: CMOS RAM

C. Allocation:

1. CPU: 1 kilobyte (Includes a 16-byte IRQ stack, and two 112-byte buffers for remote RECEIVER MODE buffering)

2. DATA STACK: 30 kilobytes

3. RE-TRANSMIT STACK: 1 kilobyte

D. Typical Event Capacity: 960 @ 32 characters/event

II. COMM PORT (RS-232C COMMUNICATIONS PORT)

A. Type: RS-232C compatible (DTE configuration)

B. Connection: To the Series 626 COMMUNICATIONS PORT via the interface cable (P/N 110540)

C. Baud Rate: Derived from the transmit/receive clock (pin 17) of the Series 626's COMMUNICATIONS PORT

D. Data Processing:

1. Received from the Series 626's COMMUNICATIONS PORT on an interrupt basis

2. Transmitted to the Series 626's COMMUNICATIONS PORT on a non-interrupt basis

III. DATA PORT

A. Type: RS-232C compatible (DCE configuration)

B. Baud Rate: User-programmable to 300, 1200, 2400, 4800, or 9600 baud

NOTE

The DATA PORT's baud rate should be greater than or equal to the COMM PORT's baud rate.

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

Table 1-1. Technical Specifications (page 2 of 5)

C. Connection Request: Initiated by pressing the rear panel DATA PORT RING push button, or via the DATA PORT Ring line (pin 22) being pulsed ON/OFF

D. Status Indicator: Red LED on the rear panel lights whenever the DATA PORT is active

E. Data Processing:

1. Received from the DATA PORT on a non-interrupt basis

2. Transmitted to the DATA PORT on an interrupt basis when the stack data are being transmitted, and on a non-interrupt basis when in the RECEIVER MODE

F. Data Transmission Protocol:

1. Comparable to ISO 1745, except:

   a. When in RECEIVER MODE, operates transparently, full duplex--Series 626 protocol followed

   b. When in a wait loop, if the timer times out, instead of re-transmitting the current block, the next block of data is transmitted

2. Control characters sent out of the Series 626 for data transmission are suppressed and only inserted according to ISO 1745

3. Typical transmission format:

   SOH/"STATION#xx"/STX/data (1K)/ETB/--wait time--/
   STX/data/ETB/...../STX/ last block of data /ETX/
   "END OF XMIT"/--wait time--/"BYE"/DLE/EOT
   (call terminated)

   During wait time, looks for:

   ACK: Positive Acknowledge
   NAK: Negative Acknowledge
   EOT: Terminate Call, End of Transmission

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

Table 1-1. Technical Specifications (page 3 of 5)

IV. PROGRAMMABLE FEATURES

A. Stack Memory Dump Modes:

1. NEVER	--Holds all data regardless of the stack conditions
2. STK FLL	--Transmits data when only 200 free bytes of the stack remain
3. EVRY EVNT	--Transmits each time any data goes into the stack
4. ON RQST	--Transmits only when given the proper command by an on-site user while in the PROGRAM MODE, or by a remote user while in the IMMEDIATE TRANSMIT MODE
5. EVRY X HRS	--Transmits the stack data every X hours (where X is a value from 01 to 99)
6. EVRY X HRS W/ STK FLL OPT	--Transmits the stack data every X hours with the Stack Full option (same as 2 and 5)

B. Baud Rate for the DATA PORT

1. 300
2. 1200
3. 2400
4. 4800
5. 9600

C. Station ID:

1. Min # = 00
2. Max # = 99

D. Preset Values

1. TRANSMIT MODE = ON RQST
2. Baud Rate = 300
3. Station ID = 00

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

Table 1-1. Technical Specifications (page 4 of 5)

V. OPERATIONAL DISTURBANCE MESSAGES

A. Possible Events:

1. DATA LINE DEAD	--Data line goes dead while the DATA PORT is active or an improper termination procedure is used
2. COMM PORT DEAD	--DSR or CTS signal from the Series 626 is "bad", or the transmitter or receiver will not clear
3. DATA PORT DEAD	--DATA PORT is turned off due to a self-test failure during the SYSTEM CHECK, or DSR fails, or the transmitter or receiver will not clear
4. OVFLW STK OVFLW	--Overflow Stack overflowed--stack memory full, data possibly lost ($ char will show up in the dump)
5. DATA PORT BUSY	--Transmitter busy--request for SYSTEM CHECK but the DATA PORT is active so the test cannot be made
6. RAM MEM DEAD	--CPU RAM massive failure--insufficient RAM to permit continued proper operation--the 6013's CPU is shut down
7. NO DATA SENT	--Cannot complete connection after 128 attempts, transmission request is cleared
8. RCV BUFFR OVFLW	--Receiver buffer overflow--receiver buffer for remotely received characters is full
9. DSR 626: OFF	--RS-232C COMM PORT inoperable due to loss of the DSR signal from the Series 626's COMMUNICATIONS PORT
10. DSR 626: ON	--RS-232C port is restored upon restoration of DSR signal from the Series 626's COMMUNICATIONS PORT

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

Table 1-1. Technical Specifications (page 5 of 5)

11. IRQ STK OVFLW --IRQ stack overflowed--possible loss of "disturbance" data from the 6013's CPU to the module interface

12. DATA PORT IN --Received DATA PORT connection (access) request via the rear panel DATA PORT RING push button or Ring line of the DATA PORT connector

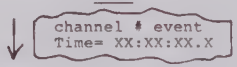
13. DATA PORT OUT --Made a successful connection out

14. DATA PORT DONE --DATA PORT connection terminated--proper termination procedure followed

B. Format:

626*

626A*



C. Short Term Accumulator:

1. The SUMMARY MODE event printout is the same as above, with the exception that no time data is shown

VI. REMOTE COMMAND SUMMARY

Command	Description	Abbreviation	ASCII
Ctrl-D	Terminates connection	(EOT)	$04
Ctrl-U	Retransmits block	(NAK)	$15
Ctrl-F	Transmits next block	(ACK)	$06
!	Dump stack command		$7C

* -If you are using a Model 626, read (from the bottom up) the "626" printouts in this manual; if you are using a Model 626A, read (from the top down) the "626A" printouts instead.

Copyright © 1985, 1986
By Dranetz Technologies, Inc.
All Rights Reserved.

1.6 FUNCTIONAL DESCRIPTION

The following subsections provide a functional description of the 6013 plug-in and its connecting peripherals.

1.6.1 RS-232C COMM PORT Connections

The 6013 plug-in's RS-232C compatible communications port, referred to as the COMM PORT, is connected to the Series 626's RS-232C COMMUNICATIONS PORT via the 626/6013 interface cable.

1.6.1.1 RS-232C COMM PORT Configurations

The 6013 plug-in's COMM PORT is configured as a DTE (Data Terminal Equipment); the Series 626's COMMUNICATIONS PORT is a DCE (Data Communications Equipment). The plug-in monitors the DSR (Data-Set-Ready) and CTS (Clear-to-Send) lines from the Series 626. Any change of state of the DSR signal produces a disturbance printout. The CTS line is allowed to be "busy" (high) for up to 80 milliseconds. If it is "busy" for more than 80 milliseconds, it is signaled as an "RS-232C PORT DEAD" error.

The COMM PORT's baud rate is determined by the Xmit/Rcv Clk signal (pin 17) from the Series 626's COMMUNICATIONS PORT. Data sent to the 6013 plug-in are processed on an interrupt basis. The data are then stored in the RAM stack until it they are retransmitted or the memory is filled up. If any data are missed (e.g., the result of an overflow, or in the unlikely occurrence that the plug-in is unable to service the interrupt in time), a special character, "$", is stored in memory in place of the overrun character to indicate that data are missing.

1.6.2 DATA PORT Connections

The 6013 plug-in's DATA PORT is configured as a DCE to allow connection to such DTEs as a terminal, printer, etc. To use the plug-in with a DCE device, such as a modem, a reversing cable must be used. The DATA PORT's baud rate is user-programmable to 300, 1200, 2400, 4800, or 9600.

NOTE

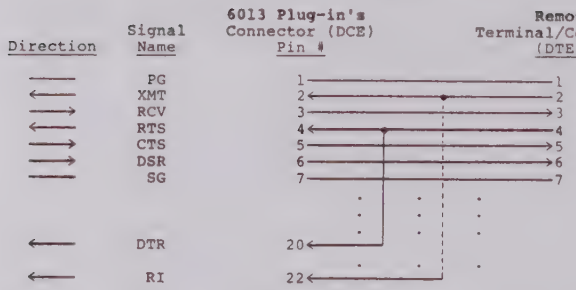
The DATA PORT's baud rate should be greater than or equal to the COMM PORT's baud rate (which is determined by the Series 626's COMMUNICATIONS PORT baud rate). This allows the data to be outputted through the DATA PORT at least as fast as it enters from the COMM PORT.

1.6.2.1 DATA PORT Connecting Pin Diagrams

Illustrated on the following page are the various pin connections for connecting the DATA PORT to DCE and DTE configured devices.

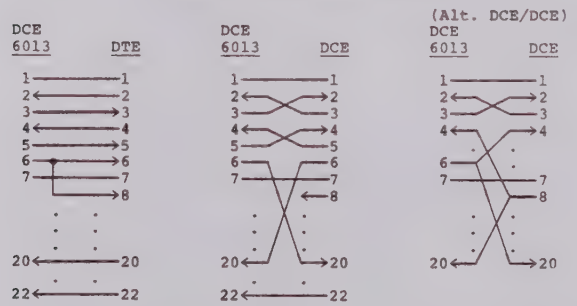
Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

DATA PORT Signal Directions
(Configuration: DCE)



If no separate Ring line is used, the XMT line (pin 2) may be connected to the RI line (pin 22) to provide a "psuedo-ring" signal (see dashed vertical line in the above diagram).

Other Possible Configurations



Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

1.6.2.2 DATA PORT Communications

Once the proper conditions of the user-selected TRANSMIT MODE have been met, the 6013 plug-in attempts communication with the device connected to its DATA PORT. If no connection has been established, the DATA PORT is turned off and the error message "NO DATA SENT" is transmitted.

If the DATA PORT device is "busy", the plug-in will try for up to 128 attempts to make a connection. If no connection is made within these attempts, the error message "NO DATA SENT" is transmitted and the DATA PORT is turned off until the Series 626 is reset or a SYSTEM CHECK is successfully completed.

1.6.3 Data Transmission Sequence

Once the connection has been made and the handshaking (connection verification) is completed, the 6013 plug-in transmits the message "STATION#XX" (where XX is the user-programmed ID number). This identifies the unit in cases where there are multiple units calling the same location. The data are then asynchronously transmitted, in 1K blocks, using 11-bit ASCII format (1 start bit, 7 data bits, 1 even parity bit, and 2 stop bits), in comparable ISO (International Standards Organization) 1745 protocol, by an interrupt driven routine to allow for maximum throughput.

When a block of data is completed or the end of the data is reached, the plug-in waits for up to 10 seconds while looking for a positive acknowledge character (ACK), a negative acknowledge character (NAK), or the end of transmission character (EOT).

If a NAK character is received, the last block of data is re-transmitted; the plug-in then returns to the 10-second wait loop. If an ACK character is received, the plug-in leaves the wait loop and the next block of data is transmitted; the plug-in then returns to the 10-second wait loop. If an EOT character is received, the access is immediately terminated. If no character is received and the wait loop times out, the next block of data is transmitted. This process continues until all of the data have been transmitted.

After all of the data have been transmitted, an "END OF XMIT" message is sent. After the final wait time has expired, the plug-in sends a "BYE" message. The data line is then disconnected and the "busy" status is cleared.

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

1.6.4 Communication Requests

If the 6013 plug-in receives a connection request (via its rear panel push button or Ring line of the DATA PORT connector), it first activates the DATA PORT by turning the PORT's DSR line on. It then waits two seconds for the line to stabilize. Next, the plug-in turns its RTS on, which appears as a DCD and CTS signal to the DATA PORT device. The plug-in checks for a DTR signal from the DATA PORT and then waits for up to 2.5 seconds for a Request to Send (RTS) signal. Once all signals are established, the plug-in sends a "?" and waits up to 16 seconds while looking for the sequence "IDXX" (where XX is the station identifier). If the correct ID sequence is not received, the plug-in disconnects the data line. (This is done in order to deter unauthorized access to the unit by making it more difficult for someone [or something] to try to "guess" the access code.

NOTE

If the "psuedo-ring"* signal configuration (XMT-RI) is used (refer to the top diagram of subsection 1.6.2.1), the first character received by the 6013 plug-in activates the Ring/Answer procedure. After the character is received by the plug-in, it responds (after a brief 2.5 second time-out) with the "?" character. All operation is then the same as before--you must enter "IDXX", etc.

1.6.4.1 Communication

If the proper characters are received, the 6013 plug-in waits one second and then sends the message "XX-READY". This informs you that the system is ready to receive data. The 1-second wait allows any other Series 626s connected to the same port lines (e.g., multiple extensions) to disconnect, and only the one with the correct ID number to answer. The plug-in is placed in the RECEIVER MODE (transparent to the remote user). All data received from the remote end are sent to the Series 626's COMMUNICATIONS PORT via a 112-character buffer.

---

* -The "psuedo-ring" configuration allows the Ring signal to be generated by the first character received from the transmission line. After the character is received, the 6013 plug-in behaves exactly as described above--after the connection request is detected, the plug-in activates the port by turning on the DSR, etc.

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

NOTE

If the baud rate of the Series 626's COMMUNICATIONS PORT is greater than the buad rate of the the 6013 plug-in's DATA PORT, characters may appear to be lost; however, the characters are stored in the stack memory and will be available to the DATA PORT terminal during a stack dump of the plug-in.

If RTS should drop for more than 2.5 seconds, the plug-in will send the message "BYE" and terminate the connection. When a connection is successfully completed, whether outgoing or incoming, a corresponding "DATA PORT OUT/DATA PORT IN" event message is printed by the Series 626. Similarly, when a call is terminated, a "DATA PORT DONE" message is printed. (This gives you a printed recording of all communication accesses.)

1.6.5 Stack Dump

Only the special stack dump character, "¦" (ASCII $7C), is intercepted by the 6013 plug-in. If this character is received, a check is made to see if the unit is in the IMMEDIATE TRANSMIT (ON RQST) MODE. If not, a "NOGO" message is sent, followed by "BYE", and access is terminated. (The purpose of this is to again deter access to the data, for once the data are transmitted, they are cleared from memory.) If the IMMEDIATE TRANSMIT MODE is in effect, the RECEIVER MODE is suspended until all of the data have been transmitted as described above. After completion of the stack dump, the plug-in returns to the transparent RECEIVER MODE.

1.6.6 6013 Plug-In's CPU Communication

The 6013 plug-in's CPU communicates to the module interface software via a mailbox technique. Either software program may request and gain control of the common RAM, provided the other side doesn't already have control. Simultaneous requests are prevented by clock phasing. Once the request is granted, the RAM may be written to or read from. Data are passed between the plug-in's CPU and the module interface in this manner. To signal the other side that new data are there or that certain data are requested, an IRQ line for each side may be set, and then cleared once the other side has acknowledged it.

Because the plug-in's CPU could generate interrupts faster than the module interface can process, its CPU has a 16-byte IRQ stack to send interrupts whenever possible. Any error conditions, data status requests, and program parameter changes are exchanged in this manner.

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

1.6.7 6013 Plug-In's SYSTEM CHECK Routine

The 6013 plug-in's SYSTEM CHECK routine checks the memory, COMM PORT status, and the DATA PORT.

1. To determine the size of operational (valid) memory, memory is swapped out, page by page, and a series of test characters are written in, read back, and then compared.

2. The status lines of the COMM PORT are then checked.

3. The DATA PORT is checked by selecting a TEST line, which loops the output of the transmitter back to the receiver just behind the PORT connector. A series of test characters are then sent out, read back, and compared to determine the status of the PORT. This tests nearly all of the PORT's circuitry with the exception of the switches that isolate the PORT under the test. In the event that the PORT was turned off for any reason, a successful completion of the SYSTEM CHECK routine re-enables it.

1.6.8 6013 Plug-In's Module Interface Software

The 6013 plug-in's module software interfaces to the Series 626's CPU. It controls the printing of Operational Disturbance, Program, and SYSTEM CHECK printouts, as well as the program routine for the user-programmable parameters. It runs independently of the plug-in's CPU program, except when a conflict for control of the common RAM exists, or when it is waiting for a data response from the plug-in's CPU software.

1.7 STANDARD ACCESSORIES

Part #	Quantity	Description
TM-111916 Volume 1	1	Operator's manual
P/N 110540	1	626/6013 interface cable

1.8 OPTIONAL ACCESSORIES

Part #	Quantity	Description
TM-111916 Volume 2	1	Service (Maintenance) manual

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

1.9 FACTORY REPAIR

When factory repair is required, proceed as follows:

1. Contact the Dranetz Service Corporation (formerly Dranetz Technologies, Inc., Customer Service Department) in order to obtain an authorization number for factory repair.

   Telephone No: (201) 755-7081

   TWX: (710) 997-9553

   Telex: 499-7808

   Cable: DRANETZ

2. Fill out the REPAIR/SERVICE ORDER form enclosed in the Series 626 Operating manual. Ship it along with the malfunctioning equipment to the Dranetz Service Corporation.

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

SECTION II
INSTALLATION AND OPERATION

2.1 GENERAL

This section contains the installation, programming, and operating instructions for the 6013 plug-in.

2.2 LOAD RATINGS

The Series 626 standard Mainframe has an upper limit of the combined total rating of its installed modules. The overall Mainframe capacity is set at 20 units. The individual modules (existing as of this printing) have the following load ratings:

Table 2-1. Load Ratings

Plug-in	Load Rating
626-PA-6001	2 Units
626-PA-6001 with extra option bd.	3 Units
626-PA-6002	2 Units
626-PA-6003	4 Units
626-PA-6005	2 Units
626-PA-6006	2 Units
626-PA-6007	1 Unit
626-PA-6008	2 Units
626-PA-6009	4 Units
626-PA-6011	1 Unit
626-PA-6012	2 Units
626-PA-6012A	3 Units
626-PA-6013	2 Units
626-PA-6014	1 Unit
626-PA-6015	4 Units
626-PA-6018	4 Units
626-PA-6020	4 Units

NOTE

When selecting modules for installation into any Series 626 Mainframe, verify that the sum of the load ratings of the installed modules DOES NOT exceed 20 Units.

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

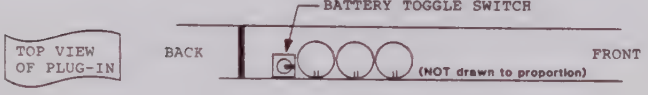
2.3 INSTALLATION

To install the 6013 plug-in into the Mainframe, proceed as follows:

WARNING

Be sure that the Series 626 Mainframe and all of the power connected to its plug-in modules are first turned OFF before proceeding with any installation.

1. Remove the 6013 plug-in from its packaging. Flip the battery ON/OFF toggle switch, located on the top of the left-hand board (near the batteries), to the ON position (toward the batteries).



CAUTION

Power is now supplied to the on-board CMOS RAM. Be careful not to "short" any traces, otherwise damage may result. Also, shorting any of the terminal pins on the bottom of the board may cause a loss of data.

NOTE

When storing the 6013 plug-in outside the Series 626 Mainframe, set the battery toggle switch to the "OFF" position to prevent possible damage to the plug-in.

2. Position the top and bottom front corners of the plug-in module into the upper and lower tracks of the desired slot position at the rear of the Series 626 Mainframe.

3. Carefully slide the module into the Mainframe until it is firmly in position.

4. Tighten the top and bottom captive screws in order to secure the module to the Mainframe.

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

2.3.1 Connecting the 6013 Plug-In

The 6013 plug-in has two connectors on its rear panel. One is for connection to the Series 626 Mainframe, and the other is for connection to a terminal, printer, CRT, modem, etc. To connect the plug-in, proceed as follows:

1. Connect one end of the 626/6013 interface cable (P/N 110540) to the 6013 plug-in's COMM PORT, and the other end to the Series 626's RS-232C COMMUNICATIONS PORT.

2. Connect the 6013 plug-in's DATA PORT to your terminal, printer, CRT, modem, etc., with an appropriate interface cable. (Refer to the diagrams in subsection 1.6.2.1 for the pin-outs and the proper wiring for connecting to DCE and DTE configurations.)

2.4 OPERATING THE 6013 PLUG-IN

This following subsection contains information on the Series 626's operating controls and indicators used by the 6013 plug-in.

2.4.1 Operating Controls and Indicators

The 6013 plug-in uses a menu-style format for selecting items. The functions of the Series 626's operating controls and indicators used by the 6013 plug-in are described in Table 2-2 on the following page. Figure 2-1 on the page after illustrates these controls on a typical front panel of a Series 626. For a description of the controls common to overall Series 626 operation, refer to Volume 1 of TM-106650U (Series 626 Universal Disturbance Analyzer Operator's Manual).

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

Table 2-2. 6013 Plug-In Operating Controls

ITEM	FUNCTION
Numeric Keyboard*	Allows the selection of menu items
Numeric Keys	Used to enter numerical values for the various functions.
[DATA] push button	Produces a Data Summary printout when pressed.
[PROG] push button	Produces a Program Summary printout when pressed.
[PRESET] push button	With the FUNCTION key switch set at "PROGRAM", and a channel push button [1], [2], [3], [4], or [5] depressed, pressing [PRESET] recalls the "Factory Preset" program for that channel.
[ENTER] key	Transfers the numeric keyboard value into the 6013 plug-in's main memory when pressed.
[FNC] key	When pressed and then followed by a [1], [2], [3], [4], or [5] key, the [FNC] key allows you to 1) clear the plug-in's memory, 2) program the TRANSMIT MODE, 3) program the station ID, 4) perform an immediate data transmission, or 5) program the DATA PORT's baud rate (respectively).
OTHER FRONT PANEL CONTROLS AND INDICATORS	Refer to Volume 1 of the Mainframe Manual (Operator's Manual).

* -"Key" and "keyboard" represent the red, green, and yellow keys. "Push button" represents the black selector buttons.

Copyright © 1985, 1986
By Dranetz Technologies, Inc.
All Rights Reserved.

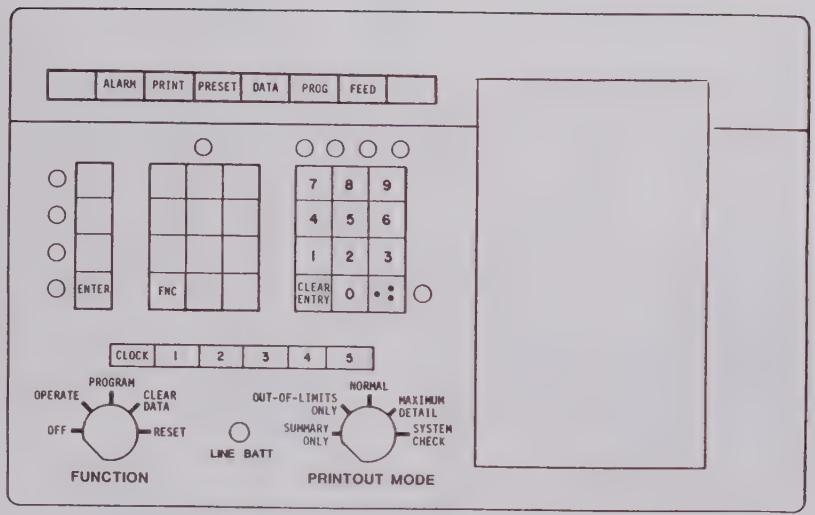


Figure 2-1. Series 626 Controls used by the 6013 Plug-in

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

2.5 6013 PLUG-IN PROGRAMMING OPERATIONS AND FUNCTIONS

The 6013 plug-in allows five programming operations and functions while in the PROGRAM MODE. They are:

1. Clearing the 6013 plug-in's stack memory (CLR MEM).
2. Programming the TRANSMIT MODE (XMIT MODE).
3. Programming the 2-Digit Station ID Number (ID #).
4 Performing an Immediate Transmission of the data in the stack memory (XMIT).
5. Programming the DATA PORT's Baud Rate (BAUD RATE).

2.5.1 Programming Procedure for the 6013 Plug-In

(1) Turn on the Series 626. Turn the FUNCTION key from the "OPERATE" position to the "PROGRAM" position.

a. A Program Summary for the currently selected channel will be immediately printed.*

(2) Press the channel push button (one through five) corresponding to the slot position of the 6013 plug-in.

a. The channel's Program Summary is immediately printed.

NOTE

The "Factory Preset" program may be recalled at any time during the PROGRAM MODE. (Refer to subsection 2.5.2 for more information on the PRESET function.)

b. The red LED above the center bank of keys lights, and the following is printed:

* -If the selected channel is empty, the message "CHANNEL EMPTY" is printed.

Copyright © 1985, 1986
By Dranetz Technologies, Inc.
All Rights Reserved.

NOTE

The parameters programmed under subsections 2.5.1.1 thru 2.5.1.4 do not have to be programmed in their given order. Use whatever order is appropriate for your specific situation when programming them.

2.5.1.1 **Programming the Baud Rate**

a. The red LED above the center bank of keys should be lit.

(1) Press the red [FNC] key.*

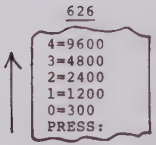
(2) Press [5] to begin programming the baud rate.

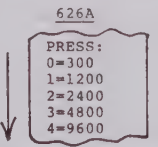
a. Because FNC5=BAUD RATE. (See printout in subsection 2.5.1, step (2)b.)

b. The green LED next to the [ENTER] key lights, waiting for [ENTER] to be pressed.**

(3) Press [ENTER].

a. The green LED goes out and the following prompt message is printed:





b. One yellow LED lights, indicating that the digit corresponding to the desired baud rate must now be entered.

(4) Press the [0], [1], [2], [3], or [4] key.

a. For Example: For a baud rate of 300, press [0].

* -Numbers and letters shown in brackets "[]" in this manual stand for the individual red, green, and yellow keys.

** -Pressing [CLEAR ENTRY] before [ENTER] will clear the current sequence of numeric keys which have been pressed.

Copyright © 1985, 1986
By Dranetz Technologies, Inc.
All Rights Reserved.

NOTE

If the PORT status is "bad" ("DATA PORT BAD") or "busy" ("DATA PORT BUSY"), the previous printout will not occur when [ENTER] is pressed; the program sequence returns to the level of subsection 2.5.1, step (2)b. The baud rate cannot be changed when the PORT status is "bad" or "busy".

2.5.1.2 **Programming the TRANSMIT MODE (XMIT MODE)**

a. The red LED above the center bank of keys should be lit.

(1) Press [FNC].

a. A single yellow LED lights.

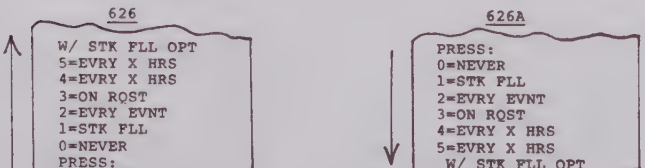
(2) Press [4].

a. Because FNC4=XMIT.

b. The green LED lights.

(3) Press [ENTER].

a. The following list of TRANSMIT MODE options is printed:



b. A single yellow LED lights, indicating that a digit, [0] through [5], must be pressed to enter the desired TRANSMIT MODE.

(4) Press the key, [0] through [5], corresponding to your desired TRANSMIT MODE.

a. If a [0] through [3] key is pressed, the programming sequence returns to the level of subsection 2.5.1, step (2)b, without need for further entries, i.e., disregard step (5).

Copyright © 1985, 1986
By Dranetz Technologies, Inc.
All Rights Reserved.

(5) Enter the "hours" digits and press [ENTER]--if a [4] or [5] key was previously pressed.

a. For Example: If your desired TRANSMIT MODE is every eight hours, first press [4] (because 4=EVRY X HRS).

b. The green LED lights.

c. Press [ENTER].

d. The following is printed:

e. Two yellow LEDs light, indicating that the hours between transmissions must now be entered. The entered value may range from 01 to 99 hours (leading zeroes must be entered).

f. Enter the "hours" digits: [0] [8].

g. The green LED lights.

h. Press [ENTER].

i. The new programming is now stored in CMOS RAM. A new Program Summary showing the new program values is printed; the programming sequence returns to the level of subsection 2.5.1, step (2)b.

2.5.1.3 **Programming the Station ID Number (ID #)**

a. The red LED above the center bank of keys should be lit.

(1) Press [FNC].

a. A single yellow LED lights.

(2) Press [3].

a. Because FNC3=ID #.

b. The green LED lights.

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

(3) Press [ENTER].

a. The following prompt is printed:

b. Two yellow LEDs light, indicating that the ID number, a value ranging from 00 to 99, must now be entered. (Leading zeroes must be included.)

(4) Press the keys corresponding to the ID number.

a. For Example: To enter an ID number of 42, press the [4] and then [2] key.

(5) Press [ENTER].

a. The new ID number is stored in memory, an updated Program Summary is printed, and the programming sequence returns to the level of subsection 2.5.1, step (2)b.

2.5.1.4 Performing an Immediate Data Transmission (XMIT)

a. The TRANSMIT MODE must be programmed to ON RQST. Do this by repeating subsection 2.5.1.2 and selecting a [3] for the ON RQST option of the TRANSMIT MODE.

NOTE

If an Immediate Transmit is attempted while the TRANSMIT MODE is not set to ON RQST, the programming sequence will return immediately to the level of subsection 2.5.1, step (2)b.

b. The red LED above the center bank of keys should be lit.

(1) Press [FNC].

a. A single yellow LED lights.

(2) Press [4].

a. The green LED lights.

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

(3) Press [ENTER].

a. The following prompt message is printed:

(4) Press [0] and then [ENTER] to abort; press [1] and then [ENTER] to confirm YES.

a. The printout in step (3)a is a confirmation step to safeguard against accidental transmissions which would result in the loss of data. If a [0] is pressed, followed by [ENTER], the immediate transmission sequence is aborted and the programming sequence returns to the level of subsection 2.5.1, step (2)b. If a [1] is pressed, followed by [ENTER], the immediate transmission sequence is initiated and the following message is printed:

A Program Summary is printed and the programming sequence returns to the level of subsection 2.5.1, step (2)b.

2.5.1.5 Clearing the 6013 Plug-In's Memory

a. The red LED above the center bank of keys should be lit.

(1) Press [1].

a. Because FNC1=CLR MEM.

b. The verification prompt message is printed as follows:

c. A single yellow LED will light.

(2) Press [0] and then [ENTER] to abort; press [1] and then [ENTER] to confirm YES.

Copyright © 1985, 1986
By Dranetz Technologies, Inc.
All Rights Reserved.

a. If [0] is pressed, followed by [ENTER], the CLEAR MEMORY sequence is aborted and the programming sequence returns to the level of subsection 2.5.1, step (2)b.

b. If [1] is pressed, followed by [ENTER], the following is printed:

```
! CLR MEM
```

c. This acknowledges the erasure of all previously stored data.

d. The programming sequence returns to the level of subsection 2.5.1, step (2)b.

2.5.1.6 **Completion of the Programming**

When the 6013 plug-in's programming is completed, you may proceed to program another module, by pressing another channel push button, or place the Series 626 on-line by turning the FUNCTION key to the "OPERATE" position.

While on-line, you may obtain the program currently in effect by simply pressing the black [PROG] push button.

2.5.2 **Selecting the "Factory Preset" Program**

To select the "Factory Preset" program, proceed as follows:

(1) Turn the FUNCTION key to the "PROGRAM" position.

a. A Program Summary for the currently selected channel is immediately printed.*

(2) Press the channel push button (one through five) corresponding to the slot position of the 6013 plug-in.

a. The channel's Program Summary is immediately printed.

b. The red LED above the center bank of keys lights and the following is printed:

626

```
FNC5=BAUD RATE
FNC4=XMIT
FNC3=ID #
FNC2=XMIT MODE
FNC1=CLR MEM
```

626A

```
FNC1=CLR MEM
FNC2=XMIT MODE
FNC3=ID #
FNC4=XMIT
FNC5=BAUD RATE
```

* -If the selected channel is empty, "CHANNEL EMPTY" is printed.

Copyright © 1985, 1986
By Dranetz Technologies, Inc.
All Rights Reserved.

(3) Ignore this printout and press the black [PRESET] push button.

a. This recalls the "Factory Preset" program from memory.

b. A Program Summary indicating the PRESET values is printed, and the programming sequence returns to the level of Subsection 2.5.1, step (2)b.

c. An example of the "Factory Preset" printout is as follows:

626

```
ON RQST
XMIT MODE:
BAUD RATE: 300
STATION ID # 00

   626-PA-6013
      CH 1

TIME = 22:15:19.96
 PROGRAM SUMMARY
```

626A

```
 PROGRAM SUMMARY
TIME = 22:15:19.96

      CH 1
  626-PA-6013

STATION ID # 00
BAUD RATE: 300
XMIT MODE:
ON RQST
```

NOTE

The "Factory Preset" program cannot be recalled while the DATA PORT's status is "bad" or "busy".

2.6 OPERATIONAL PRINTOUTS

This subsection contains information on obtaining an Operational Disturbance Printout, Data Summary Printout, and Short-Term Accumulator's Printout.

2.6.1 Operational Disturbance Printout

Any operational disturbances encountered by the 6013 plug-in are printed by the Series 626. These printouts are not affected by any of the various printout modes of the Series 626. The possible Operational Disturbance printouts are listed in Table 1-1, Roman Numeral V. A typical example is as follows:

626

```
TIME 12:29:04.15
1 DSR 626: ON
```

626A

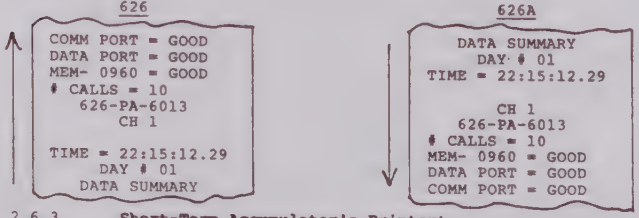
```
1 DSR 626: ON
TIME 12:29:04.15
```

Copyright © 1985, 1986
By Dranetz Technologies, Inc.
All Rights Reserved.

2.6.2 Data Summary Printout

A Data Summary printout is requested by pressing the black [DATA] push button while the FUNCTION key is in the "OPERATE" position. It will also be automatically printed each day at midnight (refer to TM-106650U for an explanation).

The Data Summary printout serves as a status check for the 6013 plug-in. The following is an example of a typical Data Summary printout:



2.6.3 Short-Term Accumulator's Printout

If disturbances occur at a faster rate than the Series 626 is capable of processing and printing, and if the Series 626's internal event stack memory overflows, then any subsequent events are stored in the Short-Term Accumulator (in summary form) until the overflow condition is cleared.

NOTE

The overflow problem may be avoided to some extent by setting the Series 626's baud rate to 9600 and turning off its printer. The 6013 plug-in will then collect up to 960 disturbance events.

The event values are automatically cleared after the printout of the Short-Term Accumulator is completed. The event format is identical to the Operational Disturbance printout, with the exception that no time data are printed. An example of a typical Short-Term Accumulator's printout is as follows:

Copyright © 1985, 1986
By Dranetz Technologies, Inc.
All Rights Reserved.

2.7 REMOTE LOG-ON PROCEDURE

To log-on the 6013 plug-in from a remote location:

(1) Connect the 6013 plug-in's DATA PORT to your terminal, printer, etc., using an appropriately configured RS-232C interface cable. (Refer to subsection 1.6.2.1 for the DATA PORT connecting pin diagram configurations.)

(2) Verify that the baud rate of the 6013 plug-in's DATA PORT and your terminal, printer, etc. are equal. If the baud rates are not equal, set them equal. (Refer to subsection 2.5.1.1 for programming the baud rate of the 6013 plug-in.)

(3) "Ring" the 6013 plug-in's DATA PORT by either:

a. Pushing the DATA PORT RING push button, or

b. If pin 2 is jumped to pin 22 (XMT-RING), send a character to the 6013 plug-in by typing any key on the remote terminal, printer, etc.

c. Pulse the Ring line (hi-lo-hi).

(4) The red LED on the rear of the 6013 plug-in lights.

(5) A question mark prompt appears on the terminal, printer, etc.

(6) Using the terminal or printer keyboard, type the letters "ID" followed immediately by XX (where XX is the unit's programmed ID number, e.g., 42, 37, 00, etc.).

(7) The 6013 plug-in responds with a "XX-READY" message, etc. It may now be remotely operated.

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

2.7.1 Memory Full Condition

When attempting to access the 6013 plug-in remotely:

If after successfully completing the log-on procedure (unit responds with the "STATION # XX READY" message) the memory is full, then attempting any operation other than a data dump of the plug-in results in a "MEMORY FULL (¦)" message echoed to the remote terminal, printer, etc.

After the data are dumped and the COMM PORT is restored, all operations are again permitted.

NOTE

Because the 6013 plug-in's batteries maintain its memory even when the Series 626 is off (provided the battery switch is on), simply turning the unit off will not clear a Memory Full condition. When the memory is full at power-on, the plug-in's COMM PORT is immediately disabled. You must either clear the data manually while in the PROGRAM MODE, or the memory must be dumped to the remote terminal, printer, etc., before the COMM PORT is restored.

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

SECTION III
OPERATIONAL TEST

3.1 GENERAL

This section describes the procedure used for verifying the 6013 plug-in's operation.

3.2 MINIMUM PERFORMANCE CHECK

A SYSTEM CHECK of the 6013 plug-in tests nearly all of its circuitry (memory, RS-232C COMM port, and DATA PORT status) to verify it is operating properly. Only the "Ring" circuit is not tested.

To perform the SYSTEM CHECK routine:

(1) Turn the PRINTOUT MODE key momentarily to the "SYSTEM CHECK" position, and then back to "NORMAL".

NOTE

On some older models of the Series 626's front panel, "SYSTEM CHECK" may instead read "CALIBRATE."

a. The following is performed:

First
To determine the size of the operational (RAM) memory, memory is swapped out, page by page, and a series of test characters are written in, read back, and then compared.

Second
The output of the DATA PORT is connected to the input and another series of characters are sent out, and then read back in. This is done to check for proper operation of the DATA PORT.

Third
The COMM PORT is checked for proper status signal levels.

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

3.3 SUCCESSFUL COMPLETION OF THE SYSTEM CHECK

Successful completion of the SYSTEM CHECK results in a printout such as the following:

626

```
**********

RS232C PORT = GOOD
DATA PORT = GOOD
MEM- 0960 = GOOD

   626-PA-6013
      CH 1

TIME = 12:34:56.78
***SYSTEM CHECK***
```

626A

```
***SYSTEM CHECK***
TIME = 12:34:56.78

      CH 1
  626-PA-6013

MEM- 0960 = GOOD
DATA PORT = GOOD
RS232C PORT = GOOD

**********
```

3.4 UNSUCCESSFUL COMPLETION OF THE SYSTEM CHECK

If the printout from the SYSTEM CHECK routine does not read "GOOD" for all three readings, e.g., "RS232C PORT = GOOD," "DATA PORT = GOOD," and "MEM- 0960 = GOOD," contact the Dranetz Service Corporation for further instructions (see subsection 1.9).

Copyright © 1985, 1986
By Dranetz Technologies, Inc.
All Rights Reserved.

WARNING

Because of possible shock or fire hazards, connection of this instrument should be performed in compliance with the National Electrical Code (ANSI C1) and/or any other requirements which may be applicable to the user.

Installation, operation, and maintenance should be performed only by qualified personnel.

TM-111026U

VOLUME 1

OPERATOR'S MANUAL

626-PA-6014

8-CHANNEL TEMPERATURE MONITOR

NOTE

Refer to Volume 2 (Service Manual) of TM-111026U for maintenance data.

15 November 1982
(Rev. 1 July 1984)
(Rev. 1 Sept. 1985)
(Rev. 1 July 1986)

© COPYRIGHT 1982, 1984, 1985, 1986 BY DRANETZ TECHNOLOGIES INC. EDISON, NEW JERSEY. ALL RIGHTS RESERVED.

DRANETZ

DRANETZ TECHNOLOGIES, INC.
1000 New Durham Rd., PO Box 4019
Edison, New Jersey 08818-4019

NOTICE CONCERNING DRANETZ' PROPRIETARY RIGHTS

This publication contains information proprietary to Dranetz Technologies, Inc. By accepting and using this manual, the user agrees that the information contained herein will be used solely for the purpose of repairing or operating equipment of Dranetz Technologies, Inc. These manuals are to be returned to Dranetz Technologies, Inc. when no longer required by the user, or when there is a change in ownership of the equipment.

These publications are protected under the Copyright laws of the United States Title 17 et seq. No part of this publication may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language or computer language, in any form, by any means, electronic, mechanical, magnetic, optical, chemical, manual, or otherwise, without the expressed written consent of Dranetz Technologies, Incorporated, 1000 New Durham Road, PO Box 4019, Edison, New Jersey 08818-4019.

TABLE OF CONTENTS

8-CHANNEL TEMPERATURE MONITOR

VOLUME 1

Section			Page
I	GENERAL INFORMATION		
	1.1	Scope	1-1
	1.2	Introduction	1-1
	1.3	Purpose	1-1
	1.4	Equipment Characteristics	1-2
	1.5	Standard Accessories	1-3
II	INSTALLATION AND OPERATION		
	2.1	Installation	2-1
	2.1.1	Load Ratings	2-1
	2.2	Connecting the Sensor Probes to Module	2-2
	2.2.1	Connection Procedure	2-2
	2.2.2	Applications	2-2
	2.3	Operating the 6014	2-2
	2.3.1	Operating Controls and Indicators	2-2
	2.3.2	Programming Procedure	2-4
	2.4	Description of Data Printouts	2-7
	2.4.1	Over Limit for Temperature	2-7
	2.4.2	Under Limit for Temperature	2-7
	2.4.3	Temperature Change	2-8
	2.5	Short Term Accumulator	2-11
III	OPERATIONAL TEST		
	3.1	General	3-1
	3.2	System Check	3-1

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

LIST OF ILLUSTRATIONS

Figure		Page
2-1	Series 626 Controls Used by the 6014 Plug-In	2-3

LIST OF TABLES

Table		Page
1-1	626-PA-6014 Specifications.	1-2
2-1	6014 Operating Controls	2-4

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

STATEMENT OF WARRANTY

ALL PRODUCTS OF DRANETZ TECHNOLOGIES, INC. ARE WARRANTED TO THE ORIGINAL PURCHASER AGAINST DEFECTIVE MATERIAL AND WORKMANSHIP FOR A PERIOD OF ONE YEAR FROM THE DATE OF DELIVERY. DRANETZ WILL REPAIR OR REPLACE, AT ITS OPTION, ALL DEFECTIVE EQUIPMENT RETURNED, FREIGHT PREPAID, DURING THE WARRANTY PERIOD, WITHOUT CHARGE FOR REPAIR, PROVIDED THERE IS NO EVIDENCE THAT THE EQUIPMENT HAS BEEN MIS-HANDLED OR ABUSED.

NOTE

The information in this manual has been reviewed and is believed to be entirely reliable. However, no responsibility is assumed for any inaccuracies. The material in this manual is for information purposes only, and is subject to change without notice.

VOLUME 1
OPERATOR'S MANUAL

626-PA-6014 8-CHANNEL TEMPERATURE MONITOR

SECTION I
GENERAL INFORMATION

1.1 SCOPE

This manual consists of two volumes. Volume 1, the Operator's Manual, is divided into three sections: GENERAL INFORMATION, II) INSTALLATION AND OPERATION, and III) OPERATIONAL TEST. VOLUME 2, the Service manual, contains the maintenance instructions.

1.2 INTRODUCTION

This manual provides operating instructions for the 626-PA-6014 and 626-PA-6014A 8-Channel Temperature Monitor Plug-ins, hereinafter referred to as the 6014. The 6014 is equipped with eight temperature probes; no pdrobes are supplied with the 6014A. Probes (P/N 111059) may be ordered separately. Since the two plug-ins operate identically, both are referred henceforth as the 6014. The 6014 is designed for installation in the Series 626 Universal Disturbance Analyzer. It is assumed that the reader is familiar with the mainframe information presented in Volume 1 of the Mainframe manual.

1.3 PURPOSE

The 6014 is an 8-input module which monitors temperature from -50 to 150 degrees C. With thresholds programmed by the user, the 6014 stores, analyzes, classifies and prints out quantitative and qualitative disturbance data. Accompanying the data is a printout of time derived from a highly accurate crystal-controlled 24-hour clock in the mainframe.

The 6014 monitors changes in any of these parameters, based on user programmable sensitivities, and high and low limits. Each input takes four readings over a 2.5 second period and then averages the readings to determine if a threshold or limit crossing has occurred. The sensitivity value of each type of disturbance, above which detection and printout occurs, is operator programmable. Except for an automatic summary printout at the end of each day, disturbance data is normally printed out only when disturbances occur. In an alternate mode, a disturbance summmary printout occurs only at the end of each day. This feature permits long term unattended operation.

The threshold program may be easily altered, using the front panel switches. Cueing indicators adjacent to the programming switches simplify the programming procedure. A back-up program for the plug-in, stored in hard memory at the factory, may always be recalled upon operator demand. Both the program and the disturbance data in the data accumulators may be printed out upon demand.

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

1.4 EQUIPMENT CHARACTERISTICS

The 6014 is configured as a plug-in module 6.5" high by 1.25" wide by 10" deep. It is designed for installation in any one of the five slots of the Series 626 Universal Disturbance Analyzer. Technical specifications of the 6014 are listed in Table 1-1.

Table 1-1. 626-PA-6014 Specifications

Input Specifications	
Temperature Range:	-50 to +150 deg C
Accuracy	+/- 2 deg C from 0 to 100 deg C +/- 3 deg C otherwise
Cable Length:	100 ft. max (30.5 m)
Cable Temperature:	200 deg C max
Programmable Parameters	
Temperature	
Low Limit:	0 deg C min (-50 deg C via Preset)
High Limit:	154 deg C max
Sensitivity:	1 deg C min
Preset to:	LO=20, HI=30, SENS=2

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

1.5 STANDARD ACCESSORIES

Part No.	Quan.	Description
111059	8	Temperature Probe
TM-111026U, Vol. 1	1	Operator's Manual

1.6 OPTIONAL ACCESSORIES

Part No.	Quan.	Description
TM-111026U, Vol. 2	1	Service (Maintenance) Manual

1.7 FACTORY REPAIR

When factory repair is required, proceed as follows:

1. Contact the Dranetz Service Corporation (formerly Dranetz Technologies, Inc., Customer Service Department) in order to obtain an Authorization Number for factory repair.

   Telephone No: (201) 755-7081

   TWX: (710) 997-9553

   Telex: 499-7808

   Cable: DRANETZ

2. Fill out the REPAIR/SERVICE ORDER form enclosed in the Series 626 Operating Manual. Ship it along with the malfunctioning equipment to the Dranetz Service Corporation.

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

SECTION II
INSTALLATION AND OPERATION

2.1 INSTALLATION

CAUTION

Be sure unit is turned off and that all power connected to all plug-in modules is off.

To install the 6014 in the mainframe, proceed as follows:

a. Position the top and bottom rear corners of the plug-in module in the upper and lower tracks at the desired slot position at the rear of the mainframe.

b. Carefully slide the module into the mainframe until it is firmly seated.

c. Tighten the top and bottom captive screws to secure the module to the mainframe.

2.1.1 Load Ratings

The Series 626 standard Mainframe has an upper limit of the total load rating of its installed modules. The overall Mainframe capacity is set at 20 Units. The individual modules have load ratings as follows

Plug-in	Load Rating	Plug-in	Load Rating
626-PA-6001	2 Units	626-PA-6012	2 Units
626-PA-6001 w/extra option bd	3 Units	626-PA-6012A	3 Units
626-PA-6002	2 Units	626-PA-6013	2 Units
626-PA-6003	4 Units	626-PA-6014	1 Unit
626-PA-6005	2 Units	626-PA-6015	4 Units
626-PA-6006	2 Units	626-PA-6018	4 Units
626-PA-6007	1 Unit	626-PA-6020	4 Units
626-PA-6008	2 Units	626-PA-6024A	4 Units
626-PA-6009	4 Units	626-PA-6024B	4 Units
626-PA-6011	1 Unit	626-PA-6030	6 Units

NOTE

When selecting modules for installation into any 626 Mainframe, verify that the sum of the load ratings of the installed modules DOES NOT exceed 20 Units.

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

2.2 CONNECTING THE SENSOR PROBES TO THE MODULE

CAUTION: To avoid damaging the equipment, do NOT connect or disconnect the probes while the unit is turned on.

2.2.1 Connection Procedure

The 6014 is supplied with eight connectors on the rear panel. Proceed as follows:

a. Insert key in FUNCTION key switch on the front panel of the mainframe and set switch to OFF position.

b. Connect the sensor plugs (1-8) to the rear panel connectors.

2.2.2 Applications

Probes: The individual sensors may be clipped or taped in place. Tie wraps with eyelets are included for this purpose.

The cables may be extended up to 100' total by the use of the optional extension P/N 111056-G2.

Uses: 1) Within the computer room, distribute probes so as to pick up temperature shifts which may be caused by blocked air handling ducts.

2) Within a system cabinet, locate the probes so as to record "hot spots" which may arise, due to poor air circulation, failed or overstressed assemblies, etc.

2.3 OPERATING THE 6014

2.3.1 Operating Controls and Indicators

The functions of the mainframe operating controls and indicators associated with the 6014 are described in Table 2-1. Figure 2-1 shows the typical front panel controls associated with a 6014 on a Series 626. For a description of controls common to overall Series 626 operation, refer to Volume 1 of the Mainframe manual.

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

Figure 2-1. Series 626 Controls Used by the 6014 Plug-In

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

Table 2-1. 6014 Operating Controls

Item	Function
INPUT pushbutton	Used to initiate channel input programming.
LO LIMIT pushbutton	When depressed, enables the numeric keyboard to program low limit for any temperature input.
SENS pushbutton	When depressed, enables numeric keyboard to program sensitivity for any input.
NUMERIC pushbuttons	When single lamp lights, user is cued to press a "1" to "8" for temperature inputs A to H, respectively. Also used to enter numerical values for other functions.
ENTER pushbutton	When depressed, transfers numeric keyboard values into 6014 memory for processing.
DATA pushbutton	When depressed, outputs data summary.
PROG pushbutton	When depressed, outputs program summary.
PRESET pushbutton	With FUNCTION switch set to PROGRAM and a channel switch (1-5) depressed, depressing PRESET switch recalls non-volatile factory program for that input.
HI LIMIT pushbutton	When depressed, enables the numeric keyboard to program high limit for any temperature input.

2.3.2 Programming Procedure

Assume it is desired to program Channel B for a temperature high limit of 35 deg C, a low limit of 15 deg C, and a sensitivity of 3 deg C.

For the example cited, program the 6014 as follows:

a. Set FUNCTION switch to PROGRAM.

b. Depress the channel pushbutton (1-5) that corresponds to the slot position of the plug-in to be programmed. Note that a program summary for that channel is immediately printed.

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

c. Note that the red LED next to the INPUT pushbutton is lit. Pushbutton must then be pressed. Note that the following prompt message is printed and a single yellow LED is lit.

626*	626A*
↑ INPUTS A - H ENTER: 1 - 8 FOR	ENTER: 1 - 8 FOR INPUTS A - H ↓

d. Depress a "1" thru "8", depending on which input you wish to change.

Note that the green LED adjacent to the ENTER key is lit, waiting for the ENTER key to be depressed.

(assume a "2" was depressed for the following example)

e. When the ENTER indicator goes out, an indicator above the center bank of pushbuttons lights. This indicates that one of the functions (HI LIMIT, LO LIMIT, SENSITIVITY) may now be programmed. At this time the PRESET button could also be depressed to change all of the parameters for all eight temperature inputs to factory-preset values.

NOTE: Custom Preset Option 101 allows the user to choose his/her own program setup for the PRESET function.

f. Depress the HI LIMIT pushbutton.

g. Note that three yellow LEDS above the numeric keyboard are now lit. Enter 035, using the keyboard. If an error is made, depress CLEAR ENTRY and then the correct entry. Note that the leading zero for numbers less than 100 must be entered.

h. When the value is entered, the lamp next to the ENTER pushbutton lights. Depress this pushbutton to enter the value.

i. Repeat steps c through h for the low limit value (015), using the LO LIMIT pushbutton.

j. Repeat steps c through h for the sensitivity value (03), using the SENS pushbutton. Note that only two yellow LEDS light in step g.

---

*If you are using a Model 626, read (from the bottom up) the "526" printouts in this manual; if using a Model 626A, read (from the top down) the "626A" printouts instead.

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

k. The same sequence is used to change any temperature input, provided that the appropriate number is entered in step c.

l. The completed program printout should take the following form:

626

```
HIGH LIMIT 070
LOW LIMIT 030
SENS 010
   INPUT H
HIGH LIMIT 055
LOW LIMIT 035
SENS 015
   INPUT G
HIGH LIMIT 035
LOW LIMIT 015
SENS 003
   INPUT F
HIGH LIMIT 075
LOW LIMIT 035
SENS 010
   INPUT E
HIGH LIMIT 044
LOW LIMIT 005
SENS 003
        *
        *
        *
        *
        *
HIGH LIMIT 035
LOW LIMIT 015
SENS 003
   INPUT B
HIGH LIMIT 130
LOW LIMIT 005
SENS 030
   INPUT A

  626-PA-6014
     CH2

PROGRAM SUMMARY
```

626A

```
PROGRAM SUMMARY

      CH 2
  626-PA-6014

   INPUT A
SENS 030
LOW LIMIT 005
HIGH LIMIT 130
   INPUT B
SENS 003
LOW LIMIT 015
HIGH LIMIT 035
        *
        *
        *
        *
        *
SENS 003
LOW LIMIT 005
HIGH LIMIT 044
   INPUT E
SENS 010
LOW LIMIT 035
HIGH LIMIT 075
   INPUT F
SENS 003
LOW LIMIT 015
HIGH LIMIT 035
   INPUT G
SENS 015
LOW LIMIT 035
HIGH LIMIT 055
   INPUT H
SENS 010
LOW LIMIT 030
HIGH LIMIT 070
```

NOTE

The instrument is designed to detect an invalid entry. For example, if the high limit value is selected as 30 deg C, and the user selects a low limit value of 35 deg C, the following printout will appear.

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

626	626A
↑ HI LIMIT 036	LO LIMIT 035 ↓
LO LIMIT 035	HI LIMIT 036

m. When the plug-in program is completed, the user may proceed to program another module (by depressing another channel number) or he (she) may place the instrument on line by setting the FUNCTION switch to OPERATE. While on line, the program currently in effect may be obtained by simply depressing the PROG pushbutton.

2.4 DESCRIPTION OF DATA PRINTOUTS

When any of the disturbances described below is detected by the 6014, it is recorded and displayed in characteristic manner.

2.4.1 Over Limit for Temperature

An over limit condition exists when the monitored average value of temperature exceeds the user-specified upper limit for the respective input. An over limit condition is indicated by a printout such as the following:

```
4B HI 10:47:12.98
      or
4F HI 10:47:09.76
```

where the 4 is the channel number, the B is for temperature input B (or 2), the F is for temperature input F (or 6) and the time is given in hours, minutes and seconds (to 0.01 sec resolution).

When the temperature recovers to normal, a printout such as the following occurs:

626	626A
↑ 4B NOR 10:55:13.77	065.5 DEG C MAX ↓
073.3 DEG C MAX	4F NOR 11:12:34.21
or	or
4F NOR 11:12:34.21	073.3 DEG C MAX
065.5 DEG C MAX	4B NOR 10:55:13.77

indicating when the normal temperature was restored and the value of the highest temperature reached during the over limit interval.

2.4.2 Under Limit for Temperature

An under limit condition exists when the monitored temperature goes below the user-specified lower limit. An under limit condition is indicated by a printout such as the following:

```
4A LO 13:33:23.78
      or
4D LO 12:59:00.01
```

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

When the temperature returns to normal, a message such as the following is printed:

626	626A
4A NOR 13:44:56.98	024.2 DEG C MIN
003.1 DEG C MIN	4D NOR 12:59:58.99
or	or
4D NOR 12:59:58.99	003.1 DEG C MIN
024.2 DEG C MIN	4A NOR 13:44:56.98

indicating when the normal condition was restored and the value of the lowest temperature reached during the under limit interval.

2.4.3 Temperature Change

A temperature printout is triggered when the temperature changes more than a preselected amount from the last printed value. The change sensitivity is a user programmable value, which is selected independently for each temperature input. The following example shows several temperature input changes. The first indicates a temperature increase to 87.3 deg C on input E; the second shows a temperature decrease to 13.3 deg C on input C (both at times shown).

626	626A
2C DEC 01:22:34.76	087.3 DEG C
013.3 DEG C	2E INC 01:23:55.32
2E INC 01:23:55.32	013.3 DEG C
087.3 DEG C	2C DEC 01:22:34.76

The following example printouts show how various settings of the PRINTOUT MODE switch change the amount of detail in the printed record of a disturbance. It is assumed that the disturbances occurred in Channel 2 and that the limits for Channel 2 were programmed as follows:

Input A LOW LIMIT	25 DEG C
Input A HIGH LIMIT	55 DEG C
Input A SENSITIVITY	05 DEG C

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

Disturbances which occur while the PRINTOUT MODE switch is in the SUMMARY ONLY position do not generate individual printouts but they are stored in the daily accumulator and are automatically printed each day at midnight (worst case event and number of occurrences in each category). This printout may also be triggered by depressing the DATA button. The following is an example of a DATA summary. (The first is the Model 626 printout; the second is the 626A printout.)

Model 626

```
MAX  +085.6 DEG C          max temperature for day
HIGH  000 HT           number of high excursions
MIN  -044.8 DEG C          min temperature for day
LOW  012 HT            number of low excursions
PRES= +019.6 DEG C         present temperature
    INPUT H
MAX  +076.8 DEG C
```

Model 626A

```
MAX   +076.8 DEG C
     INPUT H
PRES= +019.6 DEG C             present temperature
LOW   012 HT             number of low excursions
MIN   -044.8 DEG C             min temperature for day
HIGH  000 HT             number of high excursions
MAX   +085.6 DEG C             max temperature for day
```

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

The following printouts (Models 626 and 626A) illustrate under limit in NORMAL mode, over limit in OUT-OF-LIMITS ONLY mode and a data summary.

626

```
HIGH  001 HT
MIN  +034.0 DEG C
LOW  000 HT
MAX  +134.9 DEG C
HIGH  003 HT
MIN  -048.9  DEG C
LOW  003 HT
PRES= +045.5 DEG C
     INPUT A

 626-PA-6014
   CH2
10/14/83   10:48:15
  DATA SUMMARY                    Data Summary


2A NOR 12:56.38.51                Printout of over limit
   078.2 DEG C                    in OUT-OF-LIMITS ONLY mode

2A HI 12:56:34.52


2A NOR 03:55:45.98
   013.5 DEG C

2H INC 03:53:34.89
   024.8 DEG C

2A INC 03:50:57.67                Printout of under limit
   019.3 DEG C                    in NORMAL mode.

2A DEC 03:40:11.23
   013.5 DEG C

2A DEC 03:39:45.33
   021.1 DEG C


2A LO 03:39:45.33
```


COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

```
        626A

2A LO 03:39:45.33

   021.1 DEG C
2A DEC 03:39:45.33

   013.5 DEG C
2A DEC 03:40:11.23

   019.3 DEG C                    Printout of under limit
2A INC 03:50:57.67                in NORMAL mode.

   024.8 DEG C
2H INC 03:53:34.89

   013.5 DEG C
2A NOR 03:55:45.98


2A HI 12:56:34.52

   078.2 DEG C                    Printout of over limit
2A NOR 12:56:38.51                in OUT-OF-LIMITS mode.


  DATA SUMMARY                    Data Summary
10/14/83   10:48:15
    CH2
 626-PA-6014

     INPUT A
PRES= +045.5 DEG C
LOW  003 HT
MIN  -048.9  DEG C
HIGH  003 HT
MAX  +134.9 DEG C
LOW  000 HT
MIN  +034.0 DEG C
HIGH  001 HT
```

2.5 SHORT TERM ACCUMULATOR

If disturbances should take place at a rate faster than the 626 mainframe can process and print them out, and the internal event stack memory should overflow, then subsequent events are stored in summary form in the Short Term Accumulators (until the overflow condition is cleared). These values are cleared out after the printout of the Short Term Accumulators is complete. The format is identical to the Data Summary except the values are printed out only when a HI or LO limit is crossed to expedite the printing.

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

SECTION III
OPERATIONAL TEST

3.1 GENERAL

This section provides information for performing an operational test to verify that the 6014 plug-in is operating properly.

3.2 SYSTEM CHECK

When the PRINTOUT mode switch is set to SYSTEM CHECK, the precision reference signals are applied to the measuring circuitry. The probe inputs are disconnected during this time. These signals verify the operational status of the module, but not the actual sensors. The sensors can be checked by the use of a calibrated standard (a precise temperature chamber). The allowable tolerance levels are described below, along with a sample printout:

626

```
**********************

      V3=000.0        +  0.2
      V2=010.2        +/-0.3
      V1=091.9        +/-0.5

    626-PA-6014
       CH2

10/17/83   12:34:56.78
  ***SYSTEM CHECK***

**********************
```

626A

```
************************

   ***SYSTEM CHECK***
10/17/83    12:34:56.78

        CH2
   626-PA-6014

      V1=091.9        +/-0.6
      V2=010.2        +/-0.3
      V3=000.0        +  0.2

************************
```

COPYRIGHT © 1982, 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

WARNING

Because of possible shock or fire hazards, connection of this instrument should be performed in compliance with the National Electrical Code (ANSI C1) and/or any other requirements which may be applicable to the user.

Installation, operation, and maintenance should be performed only by qualified personnel.

TM-111027U

VOLUME 1

OPERATOR'S MANUAL

626-PA-6015

3-CHANNEL TRANSDUCER MONITOR

NOTE

Refer to Volume 2 (Service Manual) of TM-111027U for maintenance data.

1 May 1984
(Rev. 1 July 1984)
(Rev. 15 May 1985)
(Rev. 1 July 1986)

© COPYRIGHT 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. EDISON, NEW JERSEY.
ALL RIGHTS RESERVED.

DRANETZ TECHNOLOGIES, INCORPORATED
1000 New Durham Rd., PO Box 4019, Edison, NJ 08818-4019

NOTICE CONCERNING DRANETZ' PROPRIETARY RIGHTS

This publication contains information proprietary to Dranetz Technologies, Inc. By accepting and using this manual, the user agrees that the information contained herein will be used solely for the purpose of repairing or operating equipment of Dranetz Technologies, Inc. These manuals are to be returned to Dranetz Technologies, Inc. when no longer required by the user, or when there is a change in ownership of the equipment.

These publicatons are protected under the Copyright laws of the United States Title 17 et seq. No part of this publication may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language or computer language, in any form, by any means, electronic, mechanical, magnetic, optical, chemical, manual, or otherwise, without the expressed written consent of Dranetz Technologies, Incorporated, 1000 New Durham Road, PO Box 4019, Edison, New Jersey 08818-4019.

TABLE OF CONTENTS

626-PA-6015 3-CHANNEL TRANSDUCER MONITOR

VOLUME 1

Section			Page
I	GENERAL INFORMATION		
	1.1	Scope	1-1
	1.2	Introduction	1-1
	1.3	Purpose	1-1
	1.4	Applications	1-2
	1.5	Equipment Characteristics	1-2
	1.6	Standard Accessories	1-2
	1.7	Optional Accessories	1-2
	1.8	Factory Repair	1-4
II	INSTALLATION AND OPERATION		
	2.1	Installation	2-1
	2.2	Load Ratings	2-1
	2.3	Connecting the Cables to the Module	2-2
	2.4	Operating the 6015	2-2
	2.4.1	Programming Procedure	2-4
	2.5	Selecting the Factory/Option 101 Preset Program	2-9
	2.6	Description of Data Printouts	2-9
	2.6.1	Over Limit	2-9
	2.6.2	Under Limit	2-10
	2.6.3	Voltage Change	2-10
	2.6.4	Data Summary	2-11
	2.7	Printout Modes	2-12
	2.8	Short Term Accumulator	2-14
	2.9	Assembling Cables for the 626-PA-6015	2-14
III	OPERATIONAL CHECK		
	3.1	General	3-1
	3.2	System Check	3-1

COPYRIGHT © 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

LIST OF ILLUSTRATIONS

Figure		Page
2-1	Series 626 Controls Used by the 6015 Plug-In	2-3
2-2A	Typical Program Summary Printout - Model 626	2-7
2-2B	Typical Program Summary Printout - Model 626A. . . .	2-8
2-3A	Typical Data Summary Printout - Model 626.	2-11
2-3B	Typical Data Summary Printout - Model 626A	2-12
2-4	Examples of Printout Modes	2-13

LIST OF TABLES

Table		Page
1-1	626-PA-6015 Technical Specifications	1-3
2-1	6015 Operating Controls.	2-2

COPYRIGHT © 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

STATEMENT OF WARRANTY

ALL PRODUCTS OF DRANETZ TECHNOLOGIES, INC. ARE WARRANTED TO THE ORIGINAL PURCHASER AGAINST DEFECTIVE MATERIAL AND WORKMANSHIP FOR A PERIOD OF ONE YEAR FROM THE DATE OF DELIVERY. DRANETZ WILL REPAIR OR REPLACE, AT ITS OPTION, ALL DEFECTIVE EQUIPMENT RETURNED, FREIGHT PREPAID, DURING THE WARRANTY PERIOD, WITHOUT CHARGE FOR REPAIR, PROVIDED THERE IS NO EVIDENCE THAT THE EQUIPMENT HAS BEEN MISHANDLED OR ABUSED.

VOLUME 1
OPERATOR'S MANUAL

626-PA-6015 3-CHANNEL TRANSDUCER MONITOR

SECTION I
GENERAL INFORMATION

1.1 SCOPE

This manual consists of two volumes. Volume 1, the Operator's manual, consists of three sections: I) GENERAL INFORMATION, II) INSTALLATION AND OPERATION, and III) OPERATIONAL TEST. Volume 2, the Service manual, contains the maintenance instructions (Sections IV through VII).

1.2 INTRODUCTION

This manual provides operating instructions for the 626-PA-6015 3-Channel Transducer Monitor Plug-in, hereinafter referred to as the 6015. The 6015 is designed for installation in the Series 626 Universal Disturbance Analyzer. It is assumed that the reader is familiar with the mainframe information presented in Volume 1 of the Mainframe manual.

1.3 PURPOSE

The 6015 is a three input (channel) module which monitors DC voltages from 0 to 10V. It is designed to monitor standard 0-10vdc transducer outputs. For each input, the user may select the engineering units (i.e., BTU, RPM, PSI, etc.) as well as the full scale value--from 1 to 99900--which is equivalent to 10 Vdc input. With thresholds programmed by the user, the 6015 stores, analyzes, classifies and prints out quantitative and qualitative disturbance data. Accompanying the data is a printout of time derived from a highly accurate crystal-controlled 24-hour clock in the mainframe.

The 6015 monitors and records changes on any of its three inputs based upon user programmable sensitivities, and high and low limits. Each input (channel) takes four readings over a 0.24 second period and then averages the readings to determine if a threshold or limit crossing has occurred. The sensitivity value of each type of disturbance, above which detection and printout occurs, is operator programmable. Except for an automatic summary printout at the end of each day, disturbance data is normally printed out only when disturbances occur. In the Summary Mode, a disturbance summary printout occurs only at the end of each day. This feature permits long term unattended operation.

The threshold program may be easily altered, using the front panel switches. Cueing indicators adjacent to the programming switches simplify the programming procedure. A back-up program for the plug-in, stored in hard memory at the factory, may always be recalled upon operator demand. Both the program and the disturbance data in the data accumulators may be printed out upon demand.

COPYRIGHT © 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

1.4 APPLICATIONS

When installed in the 626 mainframe, the 6015 provides the capability to monitor several different types of transducers simultaneously, while also providing correlation to other type disturbances, such as voltage, depending on the other plug-in modules present in the mainframe. Among its typical applications are the following:

a. Input A is connected to the output of a standard 0-10 Vdc pressure transducer, whose full scale output is 2000 PSI. The reading should normally be between 1500 and 1700 PSI. The 6015 Input A is programmed so that Full Scale = 2000, Lo Limit = 1700, Sensitivity = 10, and the units are PSI.

b. Input B is used to monitor a DC power supply. The voltage output should be 2.00±40 mV. The full scale value would, therefore, be programmed to 10.000, the Hi Limit to 02.05, the Lo Limit to 1.95, the Sensitivity to 00.02 and the Units to "V".

c. A 0-5 Vdc flow transducer (max CFM = 600) is used in a pipeline, whose flow rate is normally 450 CFM. The variance must be less than ±25 CFM. Since Input C has a full scale input voltage of 10 Vdc, the corresponding programmed Full Scale value would be 1200, Hi Limit equal to 475, Lo Limit equal to 425, a Sensitivity of 5 and the Units would be CFM.

1.5 EQUIPMENT CHARACTERISTICS

The 6015 is configured as a plug-in module 6.5" high by 1.25" wide by 10" deep. It is designed for installation in any one of the five slots of the Series 626 Universal Disturbance Analyzer. Technical specifications of the 6015 are listed in Table 1-1.

1.6 STANDARD ACCESSORIES

Model No.	Part No.	Quan.	Description
626PA6015	TM-111027U, Vol. 1	1	Operator's Manual

1.7 OPTIONAL ACCESSORIES

Model No.	Part No.	Quan.	Description
626PA6015	TM-111027U, Vol. 2	1	Service (Maintenance) Manual

COPYRIGHT © 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

Table 1-1. 626-PA-6015 Technical Specifications

Accuracy of 0-10 Vdc input:	±0.2% of reading ±0.3% of F.S. ±.01% (t-25) for reading >5% of F.S. and <10.00V
Common Mode Rejection:	±350Vdc either input to chassis ground
Input Impedance:	Differential = 10 Megohm min Common mode = 50 Gigohm typical
Readings:	4 readings, averaged over 0.24 seconds
Output digit format:	5 digits, range dependent on full scale (X.XXXX, XX.XXX, XXX.XX, XXXX.X, XXXXX.)

Programmable parameters: (selectable independently for each channel)

1) Full scale value (XXX = 10.00 vdc input)
   User specifies exponent and 3 digits

Exponent	Range	Format
0	1 to 9.99	X.XX00
1	10 to 99.9	XX.X00
2	100 to 999	XXX.00
3	1000 to 9990	XXX0.0
4	10000 to 99900	XXX00.

2) Hi Limit (user specifies 4 digits)
   Range: Lo Limit +.1% of F.S.<=Hi Limit<=F.S.

3) Lo Limit (user specifies 4 digits)
   Range: 0<=Lo Limit<Hi Limit-.1% of F.S.

4) Sensitivity (user specifies 4 digits)
   Range: .1% of F.S.<=Sens<Full Scale

5) Engineering units: user specifies one
   for each channel from the following:
   V, A, OHM, %RH, C, F, PSI, V/M, BTU, CFM, RPM,
   FTC, KG, LB, PPM, PH, FT, M, WHR, MV, (blank).

COPYRIGHT © 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

1.8 FACTORY REPAIR

When factory repair is required, proceed as follows:

1. Contact the Dranetz Service Corporation (formerly Dranetz Technologies, Inc., Customer Service Department) in order to obtain an Authorization Number for factory repair.

   Telephone No: (201) 755-7881

   TWX: (710) 997-9553

   Telex: 499-7808

   Cable: DRANETZ

2. Fill out the REPAIR/SERVICE ORDER form enclosed in the Series 626 Operating manual. Ship it along with the malfunctioning equipment to the Dranetz Service Corporation.

COPYRIGHT © 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

SECTION II
INSTALLATION AND OPERATION

2.1 INSTALLATION

CAUTION

Be sure 626 is turned off and that all power connected to all plug-in modules is turned off.

To install the 6015 in the mainframe, proceed as follows:

a. Position the top and bottom rear corners of the plug-in module in the upper and lower tracks at the desired slot position at the rear of the mainframe.

b. Carefully slide the module into the mainframe until it is firmly seated.

c. Tighten the top and bottom captive screws to secure the module to the mainframe.

2.2 LOAD RATINGS

The Series 626 standard Mainframe has an upper limit of the total load rating of the installed modules. The overall mainframe capacity is set at 20 Units. The individual modules have load ratings as follows:

Plug-In	Load Rating
626-PA-6001	2 Units
626-PA-6001 With Extra Option Board	3 Units
626-PA-6002	2 Units
626-PA-6003	4 Units
626-PA-6005	2 Units
626-PA-6006	2 Units
626-PA-6007	1 Unit
626-PA-6008	2 Units
626-PA-6009	4 Units
626-PA-6011	1 Unit
626-PA-6012	2 Units
626-PA-6012A	3 Units
626-PA-6013	2 Units
626-PA-6014	1 Unit
626-PA-6015	4 Units
626-PA-6018	4 Units
626-PA-6020	4 Units
626-PA-6024A	4 Units
626-PA-6024B	4 Units
626-PA-6030	6 Units

COPYRIGHT © 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

NOTE

When selecting modules for installation into any Series 626 Mainframe, verify that the sum of the load ratings of the installed modules DOES NOT exceed 20 Units.

2.3 CONNECTING THE CABLES TO THE MODULE

The 6015 is supplied with three connectors on the rear panel. Proceed as follows:

a. Insert key in FUNCTION key switch on the front panel of the mainframe and set switch to OFF position.

b. Connect the three wired connectors to the rear panel connectors.

2.4 OPERATING THE 6015

The functions of the mainframe operating controls and indicators associated with the 6015 are described in Table 2-1. Figure 2-1 shows the typical front panel controls associated with a 6015. For a description of controls common to overall Series 626 operation, refer to Volume 1 of the Mainframe manual.

Table 2-1. 6015 Operating Controls

Item	Function
INPUT pushbuton	When depressed (when the red LED next to it is lit) it allows the user to select which input is to be programmed.
NUMERIC pushbuttons	When single lamp lights, user is cued to press a "1" thru "3" for inputs A thru C, respectively. Also used to enter numerical values for other functions.
LO LIMIT pushbutton	When depressed, enables the numeric keyboard to program low limit for selected input.
HI LIMIT pushbutton	When depressed, enables the numeric keyboard to program high limit for selected input.
SENS pushbutton	When depressed, enables the numeric keyboard to program sensitivity for selected input.

COPYRIGHT © 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

Figure 2-1. Series 626 Controls Used by the 6015 Plug-In

COPYRIGHT © 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

Table 2-1. 6015 Operating Controls (Cont'd)

Item	Function
FNC pushbutton	When depressed, allows the user to program either full scale value, or engineering units for the input selected, by then depressing a "1" or "2".
ENTER pushbutton	When depressed, transfers numeric keyboard values into 6015 memory for processing.
DATA pushbutton	When depressed, produces a data summary printout.
PROG pushbutton	When depressed, produces a program summary printout
PRESET pushbutton	With FUNCTION switch set to PROGRAM and a channel switch (1-5) depressed, PRESET switch recalls non-volatile factory program for that channel.

2.4.1 Programming Procedure

Assume it is desired to program Input B as follows:

Full Scale = 5500.0
High Limit = 4320.0
Low Limit = 3034.0
Sensitivity = 0010.0
Engr. Units = PSI

a. Set FUNCTION switch to PROGRAM.

b. Depress the channel pushbutton (1-5) that corresponds to the slot position of the plug-in to be programmed. Note that a program summary for that channel is immediately printed . For the 6015, the engineering units menu is printed after the initial program summary as follows:

COPYRIGHT © 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

626*

=20	
WHR=18	MV =19
FT =16	M =17
PPM=14	PH =15
KG =12	LB =13
RPM=10	FTC=11
BTU=08	CFM=09
PSI=06	V/M=07
C =04	F =05
OHM=02	%RH=03
V =00	A =01

626A*

V =00	A =01
OHM=02	%RH=03
C =04	F =05
PSI=06	V/M=07
BTU=08	CFM=09
RPM=10	FTC=11
KG =12	LB =13
PPM=14	PH =15
FT =16	M =17
WHR=18	MV =19
=20	

c. Note that the red LED next to the INPUT pushbutton is now lit. the INPUT key must then be pressed. Note that the following prompt message is printed and a single yellow LED is lit.

626	626A
INPUTS A,B,C	ENTER: 1,2,3 FOR
ENTER: 1,2,3 FOR	INPUTS A,B,C

d. Depress a "1", "2", or "3", depending on which input you wish to change. Note that the green LED adjacent to the ENTER key is lit, waiting for the ENTER key to be depressed. (Assume a "2" was depressed for the following example).

e. When the ENTER indicator goes out after it is depressed, an indicator above the center bank of pushbuttons lights. This indicates that one of the functions (FNC, HI LIMIT, LO LIMIT, SENSITIVITY) may now be programmed. At this time the PRESET button could also be depressed to change all of the parameters for all three inputs to factory-preset values.

f. Depress the FNC (function) key. Note that a single yellow LED lights, along with the following message:

626	626A
FNC2=UNITS	FNC1=FULL SCALE
FNC1=FULL SCALE	FNC2=UNITS

---

*If you are using a Model 626 Mainframe, refer to the "626" printouts (read up) in this manual; if using a Model 626A, refer to the "626A" printouts (read down) instead.

COPYRIGHT © 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

g. Depress a "1", followed by ENTER to invoke the full scale setup routine. Note the following message informing the user as to the selection of the exponent for the full scale value then appears:

626	626A
XXX00.=4	EXP:
XXX0.0=3	X.XX00=1
XXX.00=2	XXX.00=2
X.XX00=1	XXX0.0=3
EXP:	XXX00.=4

h. A single yellow LED is lit again. The user then enters a "3", to select a full scale range in the thousands range. This is then followed by 3 yellow LEDs being lit, instructing the user to enter the three digits corresponding to the X's in the above printout. In this example, "550" is entered. If an error is made, depress CLEAR ENTRY and then the correct entry.

i. When the value is entered, the lamp next to the ENTER pushbutton lights. Depress this pushbutton to enter the value.. The minimum full scale value that may be entered is 1, 0, 0 -- 1.00, 10.0, etc. Note that the unit echoes the following message:

F.S.=550

j. After repeating steps c-e, depress the HI LIMIT pushbutton.

k. Note that four yellow LEDS above the numeric keyboard are now lit. Enter 4320 using the keyboard. The ENTER key must again be depressed and an echo of the values entered will again result. Note that values less than 1000 must have leading zero(es) entered.

l. Repeat steps c-e, j-k for the low limit value (3034), using the LO LIMIT pushbutton.

m. Repeat steps c-e, j-k for the sensitivity value (0010), using the SENS pushbutton.

n. The same sequence is used to change any input, provided that the appropriate number is entered in step c.

o. Lastly, select the engineering units "PSI" by first depressing the FNC key in step f. Refer to the menu selection printed out, following the first program summary when program mode was first entered.

p. After the single yellow LED is lit, press "2". Note that the following prompt message is printed:

ENTER UNITS

COPYRIGHT © 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

q. Two yellow LEDs will now be lit, signifying that the 2-digit code for the particular type units selected from the menu should be entered, in this instance an "06", followed by an ENTER.

r. The completed program printout should take the form shown in figure 2-2A (for the Model 626) or figure 2-2B (for the Model 626A).

```
F.S.=10.000 V
HI LMT=05.200 V
LO LMT=04.500 V
SENS=00.100 V
  INPUT C

F.S.=5500.0 PSI          Full scale value (10V) of 5500 PSI
HI LMT=4320.0 PSI        High Limit of 4320 PSI
LO LMT=3034.0 PSI        Low limit of 3034 PSI
SENS=0010.0 PSI          Sensitivity of 10 PSI
  INPUT B

F.S.=10.000 V
HI LMT=05.200 V
LO LMT=04.500 V
SENS=00.100 V
  INPUT A

626-PA-6015
    CH2

PROGRAM SUMMARY
```

Figure 2-2A. Typical Program Summary Printout - Model 626

NOTE

The instrument is designed to detect an invalid entry. For example, if the high limit value is selected as 3000.0 and the user selects a low limit value of 3002.0 (with a full scale value of 9000), the following printout will appear:

```
HI LIMIT ADJUST
LO LMT 3002
```

COPYRIGHT © 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

The new value for the high limit is equal to the low limit plus 0.1% of full scale, in this case being 3003.0.

s. When the plug-in program is completed, the user may proceed to program another module (by depressing another channel number) or may place the instrument on line by setting the FUNCTION switch to OPERATE. While on line, the program currently in effect may be obtained by simply depressing the PROG pushbutton.

```
PROGRAM SUMMARY

    CH2
626-PA-6015

  INPUT A
SENS=00.100 V
LO LMT=04.500 V
HI LMT=05.200 V
F.S.=10.000 V

  INPUT B
SENS=0010.0 PSI          Sensitivity of 10 PSI
LO LMT=3034.0 PSI        Low limit of 3034 PSI
HI LMT=4320.0 PSI        High limit of 4320 PSI
F.S.=5500.0 PSI          Full scale value (10V) of 5500 PSI

  INPUT C
SENS=00.100 V
LO LMT=04.500 V
HI LMT=05.200 V
F.S.=10.000 V
```

Figure 2-2B. Typical Program Summary Printout - Model 626A

COPYRIGHT © 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

2.5 SELECTING THE FACTORY/OPTION 101 PRESET PROGRAM

NOTE: Customer Preset Option 101 allows the user to choose his/her own program set-up for the PRESET function.

To select the program stored in hard memory, set the FUNCTION switch to PROGRAM and depress the channel number desired. The last operator-set program will be printed out. Now depress the PRESET pushbutton to recall the factory-set program. An example of the factory-set program appears below.

626	626A
F.S.=10.000 V	PROGRAM SUMMARY
HI LMT=05.500 V	
LO LMT=04.5000 V	CH2
SENS=00.100 V	626-PA-6015
INPUT C	
	INPUT A
F.S.=10.000 V	SENS=00.100 V
HI LMT=05.500 V	LO LMT=04.500 V
LO LMT=04.5000 V	HI LMT=05.500 V
SENS=00.100 V	F.S.=10.000 V
INPUT B	
	INPUT B
F.S.=10.000 V	SENS=00.100 V
HI LMT=05.500 V	LO LMT=04.5000 V
LO LMT=04.500 V	HI LMT=05.500 V
SENS=00.100 V	F.S.=10.000 V
INPUT A	
	INPUT C
626-PA-6015	SENS=00.100 V
CH2	LO LMT=04.5000 V
	HI LMT=05.500 V
PROGRAM SUMMARY	F.S.=10.000 V

2.6 DESCRIPTION OF DATA PRINTOUTS

2.6.1 Over Limit

An over limit condition exists when the monitored signal eexceeds the user-specified upper limit for the respective input. An over limit condition is indicated by a printout such as the following:

```
4B HI 10:47:12.98
      or
4A HI 10:47:09.76
```

where the 4 is the channel number, the B is for input B (or 2), the A is for the input A (or 1) and the time is given in hours, minutes and seconds (to 0.01 sec resolution).

COPYRIGHT © 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

When the voltage recovers to normal, a printout such as the following occurs:

626	626A
4B NOR 10:55:13.77 0735.3 RPM MAX or 4A NOR 11:12:34.21 6720.9 PSI MAX	6720.9 PSI MAX 4A NOR 11:12:34.21 or 0735.3 RPM MAX 4B NOR 10:55:13.77

indicating when the normal voltage was restored and the value of the highest scaled value reached during the over limit interval.

2.6.2 Under Limit

An under limit condition exists when the monitored signal goes below the user-specified lower limit. An under limit condition is indicated by a printout such as the following:

4A LO 13:33:23.78
or
4C LO 12:59:00.01

When the voltage returns to normal, a message such as the following is printed:

626	626A
4A NOR 13:44:56.98 299.17 KG MIN or 4C NOR 12:59:58.99 0.0422 FT MIN	0.0422 FT MIN 4C NOR 12:59:58.99 or 299.17 KG MIN 4A NOR 13:44:56.98

indicating when the normal condition was restored and the value of the lowest scaled value reached during the under limit interval.

2.6.3 Voltage Change

A INC/DEC printout is triggered when the voltage changes more than a preselected amount from the last printed value. The change sensitivity is a user programmable value, which is selected independently for each input. The following example shows several input changes. The first is an RPM increase to 0879.3 RPM on input B; the second is a temperature decrease to 13.3 deg C on channel C (both at times shown).

626	626A
2C DEC 01:22:34.76 013.30 DEG C	0879.3 RPM 2B INCL 01:23:55.32
2B INCL 01:23:55.32 0879.3 RPM	013.30 DEG C 2C DEC 01:22:34.76

COPYRIGHT © 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

2.6.4 Data Summary

A printout of the present value, minimum and maximum values and number of over-limit and under-limit events may be triggered manually by depressing the DATA button. This also occurs automatically at midnight.

Figure 2-3A is an example of a DATA summary on a Model 626; figure 2-3B illustrates the printout obtained on a Model 626A.

```
MAX 0850.6 DEG C          max temperature for day
HIGH 023 HT               number of high-limit events
MIN 0344.8 DEG C          min temperature for day
LOW 012 HT                number of low-limit events
PRES=0519.6 DEG C         present temperature
  INPUT C

MAX 103.89 V
HIGH 003 HT
MIN 018.90 V
LOW 003 HT
PRES=045.50 V
  INPUT B

MAX 0842.0 FTC
HIGH 045 HT
MIN 0245.9 FTC
LOW 005 HT
PRES=0575.0 FTC
  INPUT A

626-PA-6015
    CH2

12/19/83   10:46:15
  DATA SUMMARY
```

Figure 2-3A. Typical Data Summary Printout - Model 626

COPYRIGHT © 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

2.7 PRINTOUT MODES

Printouts showing how various settings of the PRINTOUT MODE switch change the amount of detail in the printed record of the same disturbance sequence are shown in figure 2-4. It is assumed that the disturbances occurred in Input A and that the limits for Input A were programmed as follows:

```
FULL SCALE = 1000.0 FTC
HIGH LIMIT = 0550.0 FTC
LOW LIMIT  = 0250.0 FTC
SENSITIVITY = 0050.0 FTC
```

- -

```
DATA SUMMARY
12/19/83   10:46:15

     CH2
626-PA-6015

  INPUT A
PRES=0575.0 FTC
LOW 005 HT
MIN 0245.9 FTC
HIGH 045 HT
MAX 0842.0 FTC

  INPUT B
PRES=045.50
LOW 003 HT
MIN 018.90
HIGH 003 HT
MAX 103.89 V

  INPUT C
PRES=0519.6 DEG C          present temperature
LOW 012 HT                 number of low-limit events
MIN 0344.8 DEG C           min temperature for day
HIGH 023 HT                number of high-limit events
MAX 0850.6 DEG C           max temperature for day
```

Figure 2-3B. Typical Data Summary Printout - Model 626A

COPYRIGHT © 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

Unit in MAXIMUM DETAIL

626	626A	
2A DEC 04:15.31.87 0504.0 FTC	0504.0 FTC 2A DEC 04:15:31.87	Printout of decrement while within limits
2A NOR 04:13.38.51 0632.0 FTC MAX	0632.0 FTC MAX 2A NOR 04:13:38.51	Printout of return to normal and max value in last excursion
2A DEC 04:10:23.55 0556.0 FTC	0556.0 FTC 2A DEC 04:10:23.55	Printout of decrement while over limit
2A INC 04:08:21.99 0632.0 FTC	0632.0 FTC 2A INC 04:08:21.99	Printout of increment as went over limit
2A HI 04:08:21.99	2A HI 04:08:21.99	Printout of over limit
2A INC 03:54:21.00 0545.0 FTC	0545.0 FTC 2A INC 03:54:21.00	Printout of increment while within limits
2A INC 03:50:57.67 0486.0 FTC	0486.0 FTC 2A INC 03:50:57.67	Printout of increment while within limits
2A DEC 03:39:45.33 0547.0 FTC	0547.0 FTC 2A DEC 03:39:45.33	Printout of decrement while within limits
Unit placed in NORMAL MODE		
2A NOR 04:13:38.51 0632.0 FTC MAX	0632.0 FTC MAX 2A NOR 04:13:38.51	Printout of return to normal and max value in last excursion
2A DEC 04:10:23.55 0556.0 FTC	0556.0 FTC 2A DEC 04:10:23.55	Printout of decrement while over limit
2A INC 04:08:21.99 0632.0 FTC	0632.0 FTC 2A INC 04:08:21.99	Printout of increment as went over limit
2A HI 04:08:21.99	2A HI 04:08:21.99	Printout of over limit
Unit placed in OUT-OF-LIMITS MODE		
2A NOR 04:13.38.51 0632.0 FTC MAX	0632.0 FTC MAX 2A NOR 04:13:38.51	Printout of return to normal and max value in last excursion
2A HI 04:08:21.99	2A HI 04:08:21.99	Printout of over limit

Figure 2-4. Examples of Printout Modes

COPYRIGHT © 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

Disturbances which occur while the PRINTOUT MODE switch is in the SUMMARY ONLY position do not generate individual printouts but they are stored in the daily accumulator and are automatically printed each day at midnight (worst case event and number of occurrences in each category).

2.8 SHORT TERM ACCUMULATOR

If disturbances should take place at a rate faster than the 626 mainframe can process and print them out, and the internal event stack memory should overflow, then subsequent events until the overflow condition is cleared are stored in summary form in the Short Term Accumulators. These values are cleared out after the printout of the Short Term Accumulators is complete. The format is identical to the Data Summary except that the limit crossing counters and respective maximum or minimums are printed out only if a higher low limit was crossed.

2.9 ASSEMBLING CABLES FOR THE 626-PA-6015

To attach the wires to the pins provided in the accessory bag for use with the 626-PA-6015, AMP tool #90325-1 is recommended. If this tool is not available, the following procedure may be used instead.

1.) Take the 3-conductor twisted pair of red, green, black 24 AWG wires and untwist 2 inches at one end.

2.) Strip the insulation back 1/2" $\pm$ 1/16" and tin the wires.

3.) Insert the wire into the pin until 1/8" of insulation is touching the pin (so edge of insulation is even with the first (outer) set of tabs). Bend these tabs tightly over the insulated wire, one at a time, with a needle-nose pliers.

4.) Bend the inner tabs tightly over the stripped wire, one at a time, with a needle-nose pliers.

5.) Apply a soldering iron to the inner tab. After heating for several seconds, apply a small amount of rosin core solder to the point of contact. Let flow for several seconds and remove the soldering iron. Do not heat too long or the insulation may melt.

6.) Repeat for the remaining 2 wires in the group.

7.) When the pin has cooled, insert the pins into the connectors provided as follows, until a click is felt.

   a. Red wire into hole marked #1.
   b. Black wire into hole marked #2.
   c. Green wire into hole marked #3.

COPYRIGHT © 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

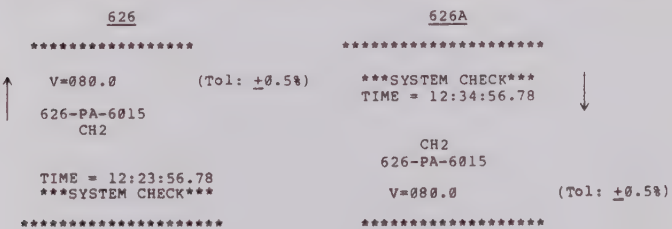
SECTION III
OPERATIONAL CHECK

3.1 GENERAL

This section provides information for performing an operational test to verify that the 6015 plug-in is operating properly.

3.2 SYSTEM CHECK

When the PRINTOUT mode switch is set to SYSTEM CHECK, the precision reference signal is applied to the measuring circuitry. This signal verifies the operational integrity of the module, but not the actual input amplifiers. The amplifiers cannot be checked without sacrificing accuracy and common mode rejection. The allowable tolerance levels are shown below, along with a sample printout:



COPYRIGHT © 1983, 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

WARNING

Because of possible shock or fire hazards, connection of this instrument should be performed in compliance with the National Electrical Code (ANSI C1) and/or any other requirements which may be applicable to the user.

Installation, operation, and maintenance should be performed only by qualified personnel.

TM-111650

VOLUME 1 — OPERATOR'S MANUAL

626-PA-6018

IMPULSE ENERGY MONITOR

See opposite side relative to proprietary rights.

NOTE: Refer to Volume 2 (Service Manual), TM-111650 for maintenance data.

© COPYRIGHT 1985, 1986
BY DRANETZ TECHNOLOGIES, INC.
ALL RIGHTS RESERVED

January 2, 1985
(Rev. 8/1/85)
(Rev. 5/1/86)

DRANETZ

DRANETZ TECHNOLOGIES, INCORPORATED
1000 New Durham Rd., PO Box 4019, Edison, NJ 08818-4019

NOTICE REGARDING DRANETZ' PROPRIETARY RIGHTS

This publication contains information proprietary to Dranetz Technologies, Inc. By accepting and using this manual, the user agrees that the information contained herein will be used solely for the purpose of repairing or operating equipment of Dranetz Technologies, Inc. These manuals are to be returned to Dranetz Technologies, Inc. when no longer required by the user, or when there is a change in ownership of the equipment.

These publications are protected under the Copyright laws of the United States Title 17 et seq. No part of this publication may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language or computer language, in any form, by any means, electronic, mechanical, magnetic, optical, chemical, manual, or otherwise, without the expressed written consent of Dranetz Technologies, Incorporated, 1000 New Durham Road, PO Box 4019, Edison, New Jersey 08818-4019.

TABLE OF CONTENTS

626-PA-6018 IMPULSE ENERGY MONITOR

VOLUME 1

Section		Page
I	GENERAL INFORMATION	1-1
	1.1 SCOPE	1-1
	1.2 INTRODUCTION	1-1
	1.3 PURPOSE	1-1
	1.3.1 Measured Parameters	1-1
	1.3.2 Impulse Measurements	1-1
	1.3.3 Disturbance Detection	1-2
	1.3.4 Threshold Selection	1-2
	1.4 APPLICATIONS	1-2
	1.5 EQUIPMENT CHARACTERISTICS	1-2
	1.6 ACCESSORIES	1-4
	1.7 FACTORY REPAIR	1-4
II	INSTALLATION AND OPERATION	2-1
	2.1 INSTALLATION	2-1
	2.1.1 Load Ratings	2-1
	2.2 INSTALLATION GUIDELINES	2-2
	2.3 OPERATING CONTROLS AND INDICATORS	2-2
	2.4 PROGRAMMING PROCEDURE	2-5
	2.4.1 Programming Summary Printout	2-6
	2.4.2 Selecting V & I Ranges	2-6
	2.4.3 Energy Range	2-6
	2.4.4 V & I Threshold Invalidity	2-7
	2.4.5 Changing The Threshold Entries	2-7
	2.4.6 Entering Thresholds into Memory	2-7
	2.4.7 Completion of the Plug-in Program	2-7
	2.5 SELECTING THE FACTORY PRESET PROGRAM	2-7
	2.6 DESCRIPTION OF DATA PRINTOUT	2-9
III	OPERATIONAL TEST	3-1
	3.1 GENERAL	3-1
	3.2 INTERNAL DIAGNOSTICS CHECK	3-1
	3.3 SYSTEM SELF-CHECK PROCEDURE	3-1
	3.3.1 System Check without the "Factory Preset" Program	3-2

COPYRIGHT © 1985
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED

APPENDIX A

A.1 INTRODUCTION A-1
A.2 PURPOSE A-1
A.3 DEFINITION OF IMPULSE ENERGY A-1
A.4 THRESHOLD SELECTION A-1
A.4.1 Voltage Threshold Selection A-2
A.4.2 Current Threshold Selection A-2
A.4.3 Continuous Impulse Printouts A-2
A.5 626 POWER SUPPLY CONNECTION A-3
A.6 INTERPRETING THE RESULTS A-3
A.6.1 Cautions Regarding Possible Result Misinterpretations A-3

LIST OF ILLUSTRATIONS

Figure		Page
1	Proper Connections of the 626-PA-6018 with the TR2019 Current Probe	2-3
2	Series 626 Controls Used by the 6018 Plug-In ...	2-4
3	A Typical Equivalent Circuit	A-3

LIST OF TABLES

Table		Page
1	626-PA-6018 Impulse Energy Monitor, Technical Specifications	1-3
2	626-PA-6018 Operating Controls	2-5
3	Alteration Measurement Changes	A-4

COPYRIGHT © 1985
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED

STATEMENT OF WARRANTY

ALL PRODUCTS OF DRANETZ TECHNOLOGIES, INC. ARE WARRANTED TO THE ORIGINAL PURCHASER AGAINST DEFECTIVE MATERIAL AND WORKMANSHIP FOR A PERIOD OF ONE YEAR FROM THE DATE OF DELIVERY. DRANETZ WILL REPAIR OR REPLACE, AT ITS OPTION, ALL DEFECTIVE EQUIPMENT RETURNED, FREIGHT PREPAID, DURING THE WARRANTY PERIOD, WITHOUT CHARGE FOR REPAIR, PROVIDED THERE IS NO EVIDENCE THAT THE EQUIPMENT HAS BEEN MIS-HANDLED OR ABUSED.

NOTE

The information in this manual has been reviewed and is believed to be entirely reliable. However, no responsibility is assumed for any inaccuracies. The material in this manual is for information purposes only, and is subject to change without notice.

VOLUME 1
OPERATOR'S MANUAL

626-PA-6018 IMPULSE ENERGY MONITOR

SECTION I
GENERAL INFORMATION

1.1 SCOPE

This manual consists of two volumes labeled Volume 1 (Operator's manual), and Volume 2 (Service manual). Volume 1 is divided into three sections (I, II, and III)--GENERAL INFORMATION, INSTALLATION AND OPERATION, and OPERATIONAL TEST. Volume 2 contains the servicing instructions and consists of four sections which begin at Roman numeral IV and end with Roman numeral VII. (See Volume 2 for a description of these sections).

1.2 INTRODUCTION

This manual provides operating instructions for the 626-PA-6018 plug-in, referred to in this manual as the 6018. The 6018 is designed for installation in the Series 626 Universal Disturbance Analyzer Mainframe, referred to in this manual as the 626. These instructions are written under the assumption that the reader is familiar with the Mainframe information described in Volume 1 of the Mainframe manual.

1.3 PURPOSE

The 6018 is designed to monitor the energy content of impulses which are occasionally encountered on ac power lines.

1.3.1 Measured Parameters

Parameters measured for each impulse include: peak voltage, peak current, implulse duration, and impulse energy. Voltage is displayed in volts, current in amps, duration in microseconds (μ), and energy in joules.

1.3.2 Impulse Measurements

The main function of the 6018 is to determine the energy content, and thereby, the destructive potential of an impulse-type disturbance. For this reason, it measures closely grouped impulses (spikes) differently than other Dranetz plug-ins. Measured values are absolute (zero voltage referenced) rather than expressed as a deviation from the normally present 50 or 60 Hz power voltage waveform. Also, when several impulses of significant amplitude occur within a 20 millisecond time period, the 6018 treats them as a single impulse. The instrument's printout will indicate the combined total duration of the separate impulses along with their combined energies. This differs from other Dranetz plug-ins which usually read only the largest single impulse in a burst and ignore the smaller adjacent ones.

COPYRIGHT © 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED

1.3.3 Disturbance Detection

Both the current and voltage thresholds are user-selectable. When either threshold is exceeded, the impulse disturbance is detected and the built-in timer becomes activated. The disturbance is considered ended when both the voltage and current readings have fallen below their respective thresholds.

1.3.4 Threshold Selection

Voltage ranges, current ranges, and thresholds are each selected by using the front panel keyboard. The use of a menu and cueing indicators to point out the correct set of keys to choose from and the number of entries required, simplify the selection process. There is also a "factory preset" program built into the 6018 which may be recalled at any time by simply depressing the [PRESET] pushbutton.

1.4 APPLICATIONS

When used in a 626 Mainframe, the 6018 provides information on the energy level and propagation direction of power line impulses. Applications include:

a) Determining if the impulse energy levels (spikes) on a power line are large enough to cause damage to the electronic equipment being serviced by the line.

b) Estimating the size and clamp voltage of the surge suppressors required to protect the equipment from line impulses.

c) Calibrating and evaluating test equipment designed to simulate power line impulses for laboratory usage.

d) Testing and evaluating impulse suppression devices.

e) Determining the origin of power line impulses in order to aid in their reduction or elimination.

1.5 EQUIPMENT CHARACTERISTICS

The 6018 is configured as a plug-in module 6½" high by 1¼" wide by 10" deep. It is designed for installation in any one of the five slots of the Series 626 Universal Disturbance Analyzer. The 6018 is a single channel device which utilizes a clamp-on current probe. Technical specifications of the 6018 are presented in Table 1 on the following page.

COPYRIGHT © 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED

Table 1. 626-PA-6018 Impulse Energy Monitor, Technical Specifications

Impulse Energy Monitor — Technical Specifications

Parameters Monitored:	Peak voltage in V ⎓ Peak current in A ⎓ Duration in µSec* ⎓ Energy in joules* ⎓
Impulse Voltage Ranges:	1000, 2000, & 4000 V FS
Impulse Current Ranges:	500, 1000, & 2000 A FS (Note: The 50/60 Hz line freq. current must not exceed 300 A rms on the monitored line).
Impulse Energy Ranges:	50, 100, 200, 400, & 600 joules F.S.
Impulse Duration Range:	999 µSec F.S.

Note: Voltage and current ranges are user-selectable while the power and energy ranges are automatically determined by the voltage and current range selections.

Impulse Characteristics:	1.0 to 999 µSec Rise or Fall time. 2.0 to 1000 µSec duration.
Ringing Transient Characteristics:	10 to 500 kHz ring frequency. 5 to 999 µSec duration.
Threshold Settings:	25 to 2000 volts. 12 to 1000 amps.

Note: Either a voltage or current threshold out-of-limits will trigger a measurement. The measurement will cease when both the voltage and current are again below their respective threshold limits.

Impulse Voltage Accuracy:	±5% of reading ±1% FS for ½ sinewave pulses ≥ 10 microseconds in duration. A typical error is -6 dB at 1 µSec duration.
Impulse Current Accuracy:	±5% of reading ±1% FS for ½ sinewave pulses ≥ 10 microseconds in duration. A typical error is -6 dB at 1 µSec duration.
Duration Accuracy:	±5% of reading ±.3% FS*
Energy Accuracy:	±10% of reading ±1% FS for ½ sinewave pulses ≥ 10 microseconds in duration. A typical error is -6 dB at 2 µSec duration.*

* Duration and energy measurements are made during the entire time in which an impulse is above either the voltage or current threshold limits.

COPYRIGHT © 1985
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED

1.6 ACCESSORIES

1.6.1 Standard Accessories

Part No.	Quantity	Description
TM-111650, Vol. 1	1	Operator's Manual
TR-2019	1	Clamp-on Current Probe

1.6.2 Optional Accessories

Part No.	Quantity	Description
TM-111650, Vol. 2	1	Service (Maintenance) Manual

1.7 FACTORY REPAIR

When factory repair is required, proceed as follows:

1. Contact the Dranetz Service Corporation (formerly Dranetz Technologies, Inc., Customer Service Department) in order to obtain an Authorization Number for factory repair.

   Telephone No: (201) 755-7081

   TWX: (710) 997-9553

   Telex: 499-7808

   Cable: DRANETZ

2. Fill out the REPAIR/SERVICE ORDER form enclosed in the Series 626 Operating manual. Ship it along with the malfunctioning equipment to the Dranetz Service Corporation.

COPYRIGHT © 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED

SECTION II
INSTALLATION AND OPERATION

2.1 INSTALLATION

To install the 6018 into the Mainframe, proceed as follows:

> **CAUTION**
>
> Be sure that the 626 Mainframe and all of the power connected to its modules is first turned OFF.

a) Position the top and bottom corners of the 6018 module into the upper and lower tracks of the desired slot position at the rear of the Mainframe.

b) Carefully slide the module into the Mainframe until it is firmly seated.

c) Tighten the top and bottom captive screws in order to secure the module to the Mainframe.

2.1.1 Load Ratings

The 626 standard Mainframe has an upper limit of the combined total rating of the installed modules. The overall Mainframe capacity is set at 20 units. The individual modules (existing at the date of this printing) have the following load ratings:

Plug-in	Load Rating	Plug-in	Load Rating
626-PA-6001	2 Units	626-PA-6009	4 Units
626-PA-6001 w/ extra option bd	3 Units	626-PA-6011	1 Unit
626-PA-6002	2 Units	626-PA-6012	2 Units
626-PA-6003	4 Units	626-PA-6012A	3 Units
626-PA-6005	2 Units	626-PA-6013	2 Units
626-PA-6006	2 Units	626-PA-6014	1 Unit
626-PA-6007	1 Unit	626-PA-6015	4 Units
626-PA-6008	2 Units	626-PA-6018	4 Units
		626-PA-6020	4 Units

NOTE

When selecting modules for installation into any 626 Mainframe, verify that the sum of the load ratings of its installed modules DOES NOT exceed 20 Units.

COPYRIGHT © 1985
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED

2.2 INSTALLATION GUIDELINES

CAUTION

To avoid damaging the equipment, DO NOT apply ac voltage in excess of 600 V rms to the 6018.

WARNING

Because of possible shock or fire hazards, connection of this instrument should be performed in compliance with the National Electric Code (ANSI C1) or any other requirements which may be applicable to the user.

The 6018 is supplied with a barrier type terminal strip under a small cover. To connect, proceed as follows:

a) Turn OFF the ac power to the line that is going to be monitored.

b) Insert the key into the FUNCTION keyswitch on the front panel of the Mainframe. Turn the key counterclockwise to the "OFF" position if it is not already in such a position.

c) Remove the terminal strip safety cover in order to expose the connections. Now, connect the single phase line to the three terminals such that the two ac leads are connected to the upper two terminals and the earth ground is connected to the third terminal (see figure 1 on the following page for the polarity required in order to provide the correct sign (±) on the impulse energy printout). When all of the connections have been made, be sure to replace the terminal block cover, then, reapply the ac power.

2.3 OPERATING CONTROLS AND INDICATORS

Figure 2 on page 2-4 shows the typical front panel layout of the controls on a Series 626. The functions of the Mainframe operating controls and indicators associated with 6018 operation are described in Table 2 on page 2-5. For a description of the controls common to overall Model 626 operation, refer to Volume 1 of the Mainframe manual.

COPYRIGHT © 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED

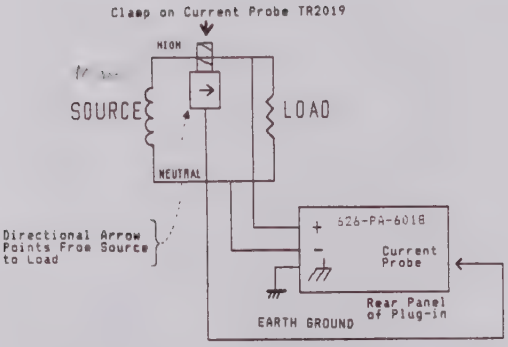


Figure 1. Proper Connections of the 626-PA-6018 with the TR2019 Current Probe.

The call-outs on Figure 2 illustrate the controls on the 626 Mainframe used by the 6018 when this plug-in is installed therein. Front panel controls and indicators which are common to overall 626 operation are described in Volume 1 of the Mainframe manual.

COPYRIGHT © 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED

Figure 2. Series 626 Controls Used by the 6018 Plug-In

COPYRIGHT © 1985
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED

The 6018 utilizes a menu-style format for selecting items and thresholds. The menu is accessed by using the numeric keypad on the front panel of the Mainframe.

Table 2. 626-PA-6018 Operating Controls

Item	Function
Numeric Keypad *	1. To select an item from menu. 2. To enter the voltage and current thresholds.
Numeric Keypad LEDs	The number of LEDs illuminated indicates the number of digits required for a complete entry.
[ENTER] key *	When depressed, transfers the numeric keypad entry into memory.
[DATA] pushbutton	When depressed, produces a Data Summary printout (assuming that the FUNCTION switch is set at "OPERATE").
[PROG] pushbutton	When depressed, produces a Program Summary printout (assuming that the FUNCTION switch is set at "OPERATE").
[PRESET] pushbutton	When depressed, returns all of the programmed parameters to their "factory preset" values for the selected channel number (assuming that the FUNCTION switch is set at "PROGRAM").
ALL OTHER FRONT PANEL CONTROLS AND INDICATORS	Refer to Volume 1 of the Mainframe Manual.

2.4 PROGRAMMING PROCEDURE

Select the channel number to be programmed by using one of the five numerated black pushbuttons located just below the red and yellow keypads. Turn the FUNCTION key clockwise to the "PROGRAM" setting. The following message will then be printed (see the following page):

---

* -The terms key and keypad represent the green and yellow keys. The term pushbutton represents the black selector buttons.

COPYRIGHT © 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED

626*

```
SELECT MENU <ITEM>
 *****************

<7>  I THRESHOLD
<6>  V THRESHOLD
<5> 2000 A RANGE
<4> 1000 V RANGE
<3>  500 A RANGE
<2> 4000 V RANGE
<1> 2000 V RANGE
<0> 1000 V RANGE
<PRESET>

 ***** MENU *****

I THRESHOLD 0200 A
V THRESHOLD 0400 V
E RANGE      200 J
I RANGE     1000 A
V RANGE     2000 V
   626-PA-6018
      CH #
 PROGRAM SUMMARY

    PROGRAM MODE
```

626A*

```
 PROGRAM MODE

 PROGRAM SUMMARY
      CH #
   626-PA-6018
V RANGE     2000 V
I RANGE     1000 A
E RANGE      200 J
V THRESHOLD 0400 V
I THRESHOLD 0200 V

 ***** MENU *****

<PRESET>
<0> 1000 V RANGE
<1> 2000 V RANGE
<2> 4000 V RANGE
<3>  500 V RANGE
<4> 1000 V RANGE
<5> 2000 A RANGE
<6>  V THRESHOLD
<7>  I THRESHOLD

*****************
     SELECT MENU <ITEM>
```

2.4.1 Program Summary Printout

The Program Summary Printout indicates the present settings of all programmable items. A single yellow LED will be illuminated indicating that a single numerical entry is required. The "SELECT MENU <ITEM>" portion of the printout shows the items which may be programmed and their corresponding numerical entry "[#]" required for selection.

Note: Be sure to select the V & I ranges before attempting to enter the thresholds.

2.4.2 Selecting V & I Ranges

In order to select a V or I range, depress the single numerical key which corresponds to the desired range indicated by the menu.

Example: Depressing [2], selects a 4000 volt range for the V threshold.

2.4.3 Energy Range

The energy range is not independantly selectable by the operator. Instead, whenever a combination of V & I ranges is selected by the operator, the energy range is automatically set by the 6018 to a range compatible with the V & I ranges selected.

*If you are using a Model 626, read (from the bottom up) the "626" printouts in this manual; if using a 626A, read (from the top down) the "626A" printouts instead.

COPYRIGHT © 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED

2.4.4 V & I Threshold Invalidity

If a previously selected V & I threshold is not valid on the V or I range selected, the threshold will automatically be changed to its "factory preset" value. Any range or threshold changes are indicated by the printer.

Note: If continuous impulse printouts are generated, increasing either the voltage or current thresholds (or both) should correct this condition.

2.4.5 Changing Threshold Entries

In order to change the V threshold, use the [6] key as indicated by the menu. The [7] key is used for changing the I threshold. When either of these keys is depressed, 3 or 4 yellow LEDs will illuminate indicating the number of digits required to complete the entry. One LED will go out every time a digit is depressed. If an error is made in the entry, depress the [CLEAR ENTRY] key. All of the numerals entered will be cleared and each of the LEDs will re-illuminate. The correct entry may now be entered.

2.4.6 Entering Thresholds into Memory

When all of the required digits have been entered, the green LED located next to the [ENTER] key will illuminate. If the entry is correct, depress the [ENTER] key in order to load it into memory. If the entry is still incorrect, the [CLEAR ENTRY] key will again clear it. If the entered threshold is either too low or too high for the range selected, it will be so indicated by the printer with the following message:

"ENTRY TOO HIGH"

When such a message is printed, all applicable LEDs will re-illuminate in order to indicate that another threshold may now be entered.

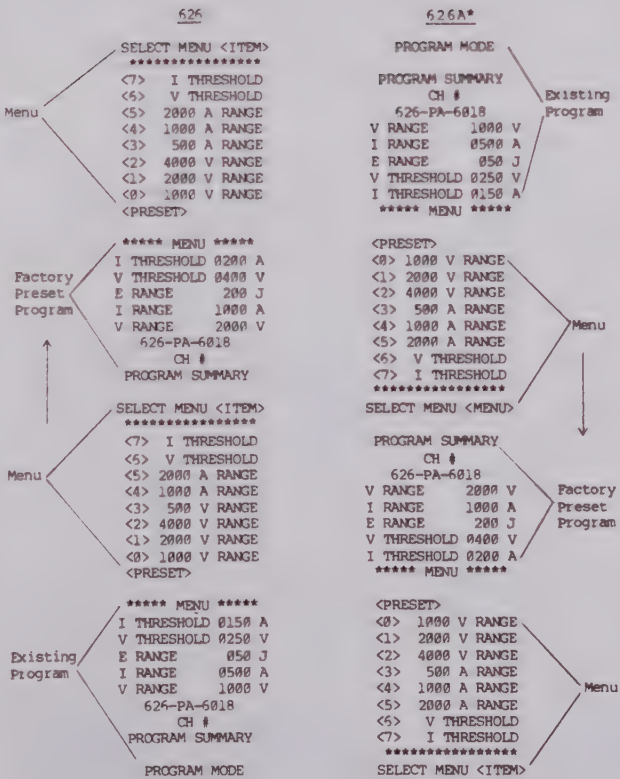
2.4.7 Completion of the Plug-in Program

When the plug-in program is completed, the operator may proceed to program another module (by depressing another channel number), or the operator may place the instrument on-line by turning the FUNCTION key counterclockwise to the "OPERATE" position. While on line, the program in effect may be obtained by simply depressing the [PROG] pushbutton.

2.5 SELECTING THE FACTORY PRESET PROGRAM

To select the program stored in hard-memory, depress the appropriate channel number pushbutton and then turn the FUNCTION key to "PROGRAM". The printer will automatically print a summary of the existing programming and menu. Next, depress the [PRESET] button in order to recall the "factory preset" program. An example of the printout for this sequence appears on the following page:

COPYRIGHT © 1985
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED



COPYRIGHT © 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED

2.6 DESCRIPTION OF DATA PRINTOUT

If the FUNCTION switch is in the "OPERATE" position, and the PRINTOUT MODE switch is in a setting other than the "SUMMARY ONLY" or "SYSTEM CHECK" position, the following is printed when either the voltage or current exceed their respective thresholds:

```
3 IMP   11:48:17.60
  0386 V    0390 A
 -006.9 J   092 US
```

where:

"3" — is the channel number.

"IMP" — is the description of the impulse event.

"11:48:17.60" — is the time that the event occurred in hours, minutes, seconds, and hundredths of a second.

"0386 V" — is the peak value of the impulse voltage in volts.

"0390 A" — is the peak value of the impulse current in amperes.

"-006.9 J" — is the total energy transferred past the point of measurement during an impulse event.*

"092 US" — is the total duration of the impulse event in microseconds.

* The "-" sign preceding the numerical value indicates the direction of energy transfer (in this case from load to source) if polarity conventions were observed when connecting the voltage inputs and installing the current probe.

NOTE: Be aware of the following operating characteristics of the 626-PA-6018 when interpreting any results:

a) The Voltage measurement is the absolute peak magnitude of the Voltage appearing between the "+" and "-" terminals of the input connector. Unlike several other plug-ins, the 6018 does not filter out the power line frequency components of the voltage waveform. This is because the energy transfered during an impulse is dependent upon where in the line frequency waveform the impulse occurs.

COPYRIGHT © 1985
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED

b) The current measurement is the absolute peak magnitude of the current flowing through the line on which the probe is clamped. Again, as with the voltage, the power line frequency components of the waveform are not filtered out.

c) Energy is the net total energy transfered during an impulse or series of impulses occuring within a 20 millisecond interval. When an individual impulse occurs, the energy is measured during the time period in which either the voltage or current waveforms exceed their respective thresholds. When a burst of impulses or a ringing waveform is measured, energy is accumulated during the total time in which a threshold is exceeded for an elapsed time of up to 20 milliseconds.

d) Duration is the total time in which either the voltage or current waveforms exceed their respective thresholds.

For Example: If a 50, 90, and 300 microsecond impulse all occur within a 20 millisecond time interval, the printout will indicate that a duration of 440 microseconds has occured.

e) If any parameter exceeds its full scale range limit, a ">" symbol is printed directly before the numerical value. The following is an example where the voltage exceeded its full scale range limit:

526	526A
3 IMP 11:34:31.56	-003.3J 083.US
>1023 V 0055 A	>1023 V 0055 A
-003.3 J 083 US	3 IMP 11:34:31.56

Since the energy value printed is derived from the voltage and current, an overrange in either the voltage or current indicates that the energy printed is below its true value. This is true even if the energy itself is well below its full scale range limit as is evidenced above.

COPYRIGHT © 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED

SECTION III
OPERATIONAL TEST

3.1 GENERAL

This section provides information for performing an Operational Test to verify that the 6018 is operating properly.

3.2 INTERNAL DIAGNOSTICS CHECK

The 6018 contains internal-pulse-generating facilities which may be used to verify the accuracy of impulse voltage, current, duration, and energy measurements. The correct operation of the voltage and current thresholds may also be verified without external testing equipment. This is because all of the plug-in's circuitry (with the exception of the input connectors, attenuators, and differential amplifiers) may be excercised by the self-contained test facilities.

3.3 SYSTEM SELF-CHECK PROCEDURE

When the PRINTOUT MODE keyswitch is turned to the "SYSTEM CHECK" position, the voltage and current input amplifiers are disconnected from their pre-amplifiers and a calibrated waveform is applied to each. The printout generated by these signals verifies the proper operation of approximately 90% of the circuitry of the 6018. A typical SYSTEM CHECK printout is illustrated below:

626	626A
**********	***SYSTEM CHECK***
0498 V 0400 A	07/18/84 16:42:55
-018.8 J 099 US	
626-PA-6018	CH 3
CH 3	626-PA-6018
	-018.8 J 099 US
07/18/84 16:42:55	0498 V 0400 A
SYSTEM CHECK	**********

If the SYSTEM CHECK is performed with the "factory preset" program, accuracy limits are as follows:

Voltage:	455 to 545 volts
Current:	370 to 430 amps
Energy:	16.0 to 24.0 joules
Duration:	92 to 108 microseconds

COPYRIGHT © 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED

3.3.1 System Check without the "Factory Preset" Program

The SYSTEM CHECK may also be run at conditions other than the "factory preset" program. If this is done, the 6018 will respond as if a 500 volt, 400 amp, 100 microsecond, approximately square impulse has been applied to the input. Voltage and current readings will be accurate to within ±5% of reading ±1% F.S. Energy and duration will remain at ±10% of reading ±1% F.S. and ±5% of reading ±0.3% F.S. respectively, as long as the V & I threshold values are not changed from their "factory preset" values. Increasing the thresholds will cause smaller duration and energy readings since the test impulse has sloped rising and falling edges. If both thresholds are increased above their respective input levels, the following message is printed for SYSTEM CHECK:

626	626A
**********	***SYSTEM CHECK***
T'HOLD > CAL PULSE	07/24/84 16:55:03
626-PA-6018	CH #
CH #	626-PA-6018
07/24/84 16:55:03	T'HOLD > CAL PULSE
SYSTEM CHECK	**********

COPYRIGHT © 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED

APPENDIX A

A.1 INTRODUCTION

The following appendix is provided as an addendum to Volume 1. Described herein are some of the finer points of the 6018 operation.

A.2 PURPOSE

This appendix provides additional information to assist the operator of the 6018 in obtaining valid measurements under field use conditions.

A.3 DEFINITION OF IMPULSE ENERGY

Measurement of impulse energy is performed by observing both the Voltage and Current waveforms of an impulse, and then calculating the following:

$$\text{Energy} = \int_{t1}^{t2} V(t)\, I(t)\, dt$$

where: V(t) — is the voltage of the High side of a single phase line with respect to the Neutral.

I(t) — is the current flowing in the High side of the line from the Source to the Load.

t1 — is the start of the impulse (V or I threshold exceeded).

t2 — is the end of the impulse (both V & I below their threshold values).

Energy will be indicated as positive when the direction of propagation is from Source to Load, and negative when the direction of propagation is from Load to Source.

A.4 THRESHOLD SELECTION

Because both the voltage and current waveforms are significant in the determination of impulse energy, individual user-selectable thresholds are provided for each of these parameters.

COPYRIGHT © 1985
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED

A.4.1 Voltage Threshold Selection

When selecting threshold Voltage, the user should be aware that the measurement band-width of the 6018 includes the 50/60 Hz power frequency range; therefore, a threshold voltage setting higher than the peak value of the line frequency Voltage is required.

For example: On a 115 volt line, a voltage threshold of 200 volts might be selected. The reasoning for the 200 volt selection is as follows:

a) V max = 110% of V nominal = 126.5 V rms

b) Allow 10% for voltage surges; therefore:
V' max = 1.1 x 126.5 = 139 V rms

c) Vpk = $\sqrt{2}$ x V rms; therefore: Vpk = 1.414 x 139 = 197 V rms

A.4.2 Current Threshold Selection

Note: Selection of an appropriate current threshold is more complex than voltage threshold selection for the following reasons:

a) There is no conveniently specified nominal current flow in a given line.

b) Current waveforms are often distorted and this prevents the peak/rms ratio from being known.

c) Many Loads require starting currents which are significantly higher than their normal running currents.

Taking these three factors into account, the user might select a current threshold as follows:

a) For a line rated at 20 amps, the nominal load is therefore less than 20 amps.

b) The Peak starting current or distortion or both could be 5 to 7 times the actual line rating.

c) Therefore, let the threshold be greater than or equal to 7 x 20 = 140 amps.

A.4.3 Continuous Impulse Printouts

When continuous impulse printouts are generated, the probable cause is that the system is being triggered by the voltage or current peaks of the power line waveform. If this is the problem, increasing either the voltage or Current thresholds or both should correct this condition.

COPYRIGHT © 1985

BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED

A.5 626 POWER SUPPLY CONNECTION

Whenever practical, the 626 should be powered from a line other than the one which is being monitored. If the 626 must be powered from the monitored line, its power cord should be connected on the Source side of the point being monitored. If the power cord is connected on the Load side, a portion of the impulse energy measured would be that which is being delivered to the 626 power supply. When powered from the Source side, the 626 may still alter the test results because its power supply tends to limit and absorb line-to-line impulses. This effect would be most significant on a lightly loaded line. Where considerable amounts of electronic equipment are already connected to a line, the additional limiting effects of the 626 power supply are less likely to be significant.

A.6 INTERPRETING THE RESULTS

Impulse energy measurements remain valid as long as the monitored system remains unchanged. While this statement is true regardless of the measured parameters, its effects are more evident for impulse current and energy measurements than for impulse voltage measurements.

A.6.1 Cautions Regarding Possible Result Misinterpretations

The most obvious error would be to attempt a pre-installation site survey on an unloaded dedicated power line. Although there may be significant impulse voltage activity, little current will flow in the line because there are no Loads yet connected. Without current flow, impulse energy will be zero, leading one to incorrectly assume that the Loads which are going to be connected will not need protection.

There are other misinterpretation possibilities for impulse energy readings. These are less obvious and therefore more likely to cause misunderstandings. If an impulse of a given amplitude is generated by a Source having a fixed impedance, the energy it delivers to a Load is a function of all parameters in the following figure:

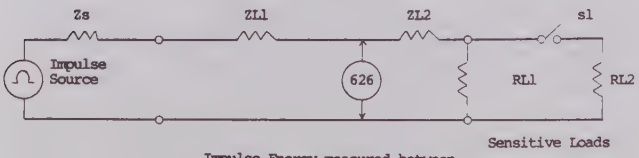


Figure 3. A Typical Equivalent Circuit.

COPYRIGHT © 1985
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED

The table below provides an insight into the changes which would occur following any alterations which could be made to the circuit of figure 3. The table also relates the measurements made before the change to the measurements made afterwards.

TABLE 3
626-PA-6018
Alteration Measurement Changes

CHANGE DESCRIPTION AND CAUSE	626-PA-6018 READING CHANGES	CHANGES AT RL1
Line impedance ZL1 reduced (improved wiring)	V increases I increases E increases	V increases I increases E increases
Line impedance ZL2 increased (Isolation transformer added)	V increases I decreases E increases or decreases	V decreases I decreases E decreases
Load impedance decreased (Close s1 to connect RL2)	V decreases I increases E increases or decreases	V decreases I decreases E decreases
Load impedance made non-linear (Transient Suppression added at RL1)	V decreases I increases E increases or decreases	V decreases I decreases E decreases

An inspection of Table 3 reveals that impulse energy changes at a sensitive Load are easier to predict than changes in the measured readings at the point being monitored. In other words, the most useful impulse energy information is that which is obtained by measuring as close to the sensitive Load as possible. If a Load can be isolated from the others and monitored individually, then the energy dissipated by it alone can accurately be determined and the effects of changes in the system can best be estimated.

COPYRIGHT © 1985
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED

WARNING

Because of possible shock or fire hazards, connection of this instrument should be performed in compliance with the National Electric Code (ANSI C1) or any other requirements, or both, which may be applicable to the user.

Installation, operation, and maintenance should only be performed by qualified personnel.

TM-111925

VOLUME 1 -- OPERATOR'S MANUAL

626-PA-6020

BROADBAND RADIO FREQUENCY (RF) MONITOR

1 September 1985

(Revised 4/1/86)

See opposite side relative to proprietary rights

Note: Refer to Volume 2 (Service Manual) TM-111925 for maintenance information.

© Copyright 1985, 1986
By Dranetz Technologies, Inc.
All Rights Reserved.

DRANETZ®
DRANETZ TECHNOLOGIES, INC.
1000 New Durham Rd., PO Box 4019
Edison, New Jersey 08818-4019

NOTICE REGARDING DRANETZ' PROPRIETARY RIGHTS

This publication contains information proprietary to Dranetz Technologies, Inc. By accepting and using this manual, the user agrees that the information contained herein will be used solely for the purpose of repairing or operating equipment of Dranetz Technologies, Inc. These manuals are to be returned to Dranetz Technologies, Inc. when no longer required by the user, or when there is a change in ownership of the equipment.

These publications are protected under the Copyright laws of the United States Title 17 et seq. No part of this publication may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language or computer language, in any form, by any means, electronic, mechanical, magnetic, optical, chemical, manual, or otherwise, without the prior written permission of Dranetz Technologies, Inc., 1000 New Durham Road, PO Box 4019, Edison, New Jersey 08818-4019.

Table of Contents (Page 1 of 2)

Section		Page
I	**GENERAL INFORMATION**	1-1
	Subsection	
	1.1 SCOPE	1-1
	1.2 INTRODUCTION	1-1
	1.2.1 A Brief Background on RF Interference	1-1
	1.3 APPLICATIONS	1-1
	1.4 PURPOSE	1-2
	1.4.1 General Operational Description	1-2
	1.4.2 User-Programmed Threshold Alterations	1-2
	1.4.3 "Factory Preset" Program	1-2
	1.5 PHYSICAL CONFIGURATION	1-3
	1.5.1 6020 Plug-In Module	1-3
	1.5.2 Antenna Unit	1-3
	1.6 TECHNICAL SPECIFICATIONS	1-3
	1.7 STANDARD ACCESSORIES	1-4
	1.8 OPTIONAL ACCESSORIES	1-4
	1.9 FACTORY REPAIR	1-4
II	**INSTALLATION AND OPERATION**	2-1
	Subsection	
	2.1 GENERAL	2-1
	2.2 LOAD RATINGS	2-1
	2.3 INSTALLATION	2-2
	2.3.1 Connecting and Positioning the Antenna Unit	2-2
	2.4 OPERATING THE 6020 PLUG-IN	2-3
	2.4.1 Operating Controls and Indicators	2-3
	2.5 PROGRAMMING THE 6020 PLUG-IN	2-6
	2.5.1 Programming Procedure	2-6
	2.5.1.1 Programming the RF Field Strength High Limit Threshold	2-7
	2.5.1.2 Programming the Average RF Sensitivity Threshold	2-8
	2.5.1.3 Programming the Burst Sensitivity Threshold	2-8
	2.5.1.4 Programming the Burst Duration Low Limit Threshold	2-9
	2.5.1.5 Completion of the Programming	2-10

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

Section — Page

Subsection

2.6 SELECTING THE "FACTORY PRESET" PROGRAM 2-10

2.7 POSSIBLE DISTURBANCE PRINTOUTS 2-11
2.7.1 RF Field Strength High Limit Disturbance Printout .. 2-11
2.7.2 RF Field Strength Deviation Printout 2-11
2.7.3 "Burst" Disturbance Printout 2-12
2.7.4 Repeating "Bursts" Disturbance Printout 2-12

2.8 VARIOUS PRINTOUT MODES 2-13

III OPERATIONAL TEST 3-1

Subsection

3.1 GENERAL 3-1

3.2 PURPOSE OF THE SYSTEM CHECK 3-1

3.3 PERFORMING THE SYSTEM CHECK 3-1
3.3.1 System Check Signals and Tolerances 3-2

Appendix A

A.1 DIFFERENCE BETWEEN A BURST DISTURBANCE AND AN RF FIELD STRENGTH HIGH LIMIT (CW) DISTURBANCE A-1

List of Illustrations

Figure — Page

2-1 Series 626 Controls used by the 6020 Plug-in 2-5

List of Tables

Table — Page

1-1 Technical Specifications 1-3

2-1 Load Ratings 2-1

2-2 6020 Plug-In Operating Controls 2-4

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

STATEMENT OF WARRANTY

ALL PRODUCTS OF DRANETZ TECHNOLOGIES, INC. ARE WARRANTED TO THE ORIGINAL PURCHASER AGAINST DEFECTIVE MATERIAL AND WORKMANSHIP FOR A PERIOD OF ONE YEAR FROM THE DATE OF DELIVERY. DRANETZ WILL REPAIR OR REPLACE, AT ITS OPTION, ALL DEFECTIVE EQUIPMENT RETURNED, FREIGHT PREPAID, DURING THE WARRANTY PERIOD, WITHOUT CHARGE FOR REPAIR, PROVIDED THERE IS NO EVIDENCE THAT THE EQUIPMENT HAS BEEN MISHANDLED OR ABUSED. THIS WARRANTY SHALL NOT APPLY TO ANY DEFECTS RESULTING FROM IMPROPER OR INADEQUATE MAINTENANCE, BUYER-SUPPLIED HARDWARE/SOFTWARE OR INTERFACING, UNAUTHORIZED MODIFICATION OR MISUSE OF THE EQUIPMENT, OPERATION OUTSIDE OF THE ENVIRONMENTAL SPECIFICATIONS FOR THE PRODUCT, OR IMPROPER SITE PREPARATION OR MAINTENANCE.

The information in this manual has been reviewed and is believed to be entirely reliable. No responsibility, however, is assumed for any inaccuracies. The material in this manual is for information purposes only, and is subject to change without notice.

VOLUME 1
OPERATOR'S MANUAL

626-PA-6020 BROADBAND RADIO FREQUENCY (RF) MONITOR

SECTION I
GENERAL INFORMATION

1.1 SCOPE

This manual consists of two volumes. Volume 1, the Operator's manual, is divided into three sections: (I) GENERAL INFORMATION, (II) INSTALLATION AND OPERATION, and (III) OPERATIONAL TEST. Volume 2, the Service manual, contains the maintenance instructions and consists of four sections, IV through VII. (See Volume 2 for a description of these sections.)

1.2 INTRODUCTION

This manual provides the installation and operating instructions for the 626-PA-6020 Broadband Radio Frequency (RF) Monitor Plug-in Module. It will be referred to simply as the 6020 plug-in. The 6020 plug-in is designed for installation into the Series 626 Universal Disturbance Analyzer Mainframe, referred to as the Series 626 or Mainframe. Also included in this manual are the instructions for connecting and positioning the Antenna Unit which comes standard with the plug-in.

Before reading these instructions further, you should be familiar with the Mainframe information described in Volume 1 of the Mainframe manual.

1.2.1 A Brief Background on RF Interference

Computer-based electronic equipment is susceptible to radio frequency (RF) interference. Significant RF field strengths are commonly produced by hand-held walkie-talkies, broadcast activity, faulty automobile ignitions, etc. RF energy can couple into the electronic equipment through its enclosure or power line, because the enclosure and power line act like an antenna attracting radio frequencies. Once coupled with the electronic equipment, RF energy can cause it to malfunction.

1.3 APPLICATIONS

Because RF interference is broadband, random, and intermittent, it is very difficult to identify as the cause of equipment malfunction. The 6020 plug-in will identify RF interferences, classify them, and store them for immediate or later printout, or both.

Copyright © 1985, 1986
By Dranetz Technologies, Inc.
All Rights Reserved.

1.4 PURPOSE

The 6020 plug-in correlates excessive RF field strength with the malfunction of computer-based electronic equipment.

The plug-in uses a broadband omnidirectional antenna to monitor RF field strength at any given point. If the RF field strength exceeds the user-programmed limits for continuous wave (CW) or burst* signals, the plug-in records the RF field strength, its duration, and time (of day) of occurrence.

NOTE

For an explanation of the difference between a Burst disturbance and an RF Field Strength High Limit (CW) disturbance, refer to Appendix A.

1.4.1 General Operational Description

Time is measured by a highly accurate, crystal-controlled 24-hour clock, built into the Series 626 Mainframe.

The 6020 plug-in monitors the continuous wave average RF field strength sensitivity, the continuous wave RF field strength high limit, and the sensitivity and duration of short bursts. All of its limits are user-programmed.

Except for an automatic Summary printout which occurs each day at midnight (Series 626 time), disturbances are printed as they occur. In an alternate mode, however, a disturbance Data Summary printout will occur only at midnight, or when the Mainframe's black [DATA] push button is pressed. This feature permits long-term unattended operation of the Series 626.

1.4.2 User-Programmed Threshold Alterations

The programmable thresholds may be easily altered using the front panel keys. Cueing indicators (LEDs) adjacent to the keys simplify the programming procedure. Both the program and the disturbance data in the data accumulator may be printed upon demand.

1.4.3 "Factory Preset" Program

A copy of the factory preset program for the 6020 plug-in is stored in non-volatile memory at Dranetz Technologies, Inc. It may always be recalled upon request if your program becomes altered or destroyed.

---

* -"Bursts" are sudden increases in electrical signal strength lasting 10 milliseconds or less.

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

1.5 PHYSICAL CONFIGURATION

1.5.1 6020 Plug-In Module

The 6020 plug-in is a single width module: 6¼" high by 1¼" wide by 10" deep. It is designed for installation into any one of the five slots of the Series 626 Mainframe.

1.5.2 Antenna Unit

The Antenna Unit supplied with the 6020 plug-in is 4½" high by 6" wide by 6" deep, and weighs approximately 20 ounces. Attached to the Antenna Unit is a 10-foot cable with a connector on its free end. The connector gets plugged into the receptacle on the 6020 plug-in's rear panel.

1.6 TECHNICAL SPECIFICATIONS

The technical specifications for the 6020 plug-in are listed in Table 1-1 which begins below.

Table 1-1. Technical Specifications (Page 1 of 2)

FREQUENCY RANGE:	1.0 MHz to 1.0 GHz
FIELD STRENGTH RANGE	
CW:	0.5 TO 8.0 volts/meter
Burst:	1.0 to 8.0 volts/meter

NOTE

A burst is defined as less than 10 milliseconds in duration.

ACCURACY:	±1.5dB @ 100 MHz @ 6.0 volts/meter
LINEARITY:	±1.5dB from 1.0 to 8.0 volts/meter; referenced to 100 MHz and 6.0 volts/meter
FREQUENCY RESPONSE:	±6dB, 1.0 MHz to 800 MHz
POLARIZATION:	Vertical
DIRECTIVITY:	Omnidirectional
MINIMUM BURST ON TIME:	1 microsecond
BURST DURATION LOW LIMIT RANGE:	0 to 5000 microseconds (whole numbers)

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

Table 1-1. Technical Specifications (Page 2 of 2)

CONTINUOUS WAVE AVERAGE RF SENSITIVITY RANGE:	0.5 to 4.0 volts/meter
CONTINUOUS WAVE RF FIELD STRENGTH HIGH LIMIT RANGE:	0.6 to 8.0 volts/meter
BURST SENSITIVITY RANGE:	1.0 to 8.0 volts/meter

NOTE

Frequency response and accuracy are based on measurements taken with the Series 626 sitting on a large ground plane. Vertical monopoles were used as the transmitting antennas.

1.7 STANDARD ACCESSORIES

Part #	Quantity	Description
TM-111925 Volume 1	1	Operator's manual
P/N 111926-G1	1	Antenna Unit with 10-foot connecting cable

1.8 OPTIONAL ACCESSORIES

Part #	Quantity	Description
TM-111925 Volume 2	1	Service (Maintenance) manual

1.9 FACTORY REPAIR

When factory repair is required, proceed as follows:

1. Contact the Dranetz Service Corporation (formerly Dranetz Technologies, Inc., Customer Service Department) in order to obtain an authorization number for factory repair.

   Telephone No: (201) 755-7081 Telex: 499-7808

   TWX: (710) 997-9553 Cable: DRANETZ

2. Fill out the REPAIR/SERVICE ORDER form enclosed in the Series 626 Operating manual. Ship it along with the malfunctioning equipment to the Dranetz Service Corp.

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

SECTION II
INSTALLATION AND OPERATION

2.1 GENERAL

This section contains the installation, programming, and operating instructions for the 6020 plug-in and its Antenna Unit.

2.2 LOAD RATINGS

The Series 626 standard Mainframe has an upper limit of the combined total rating of its installed modules. The overall Mainframe capacity is set at 20 units. The individual modules (existing as of this printing) have the following load ratings:

Table 2-1. Load Ratings

Plug-in	Load Rating
626-PA-6001	2 Units
626-PA-6001 with extra option bd.	3 Units
626-PA-6002	2 Units
626-PA-6003	4 Units
626-PA-6005	2 Units
626-PA-6006	2 Units
626-PA-6007	1 Unit
626-PA-6008	2 Units
626-PA-6009	4 Units
626-PA-6011	1 Unit
626-PA-6012	2 Units
626-PA-6012A	3 Units
626-PA-6013	2 Units
626-PA-6014	1 Unit
626-PA-6015	4 Units
626-PA-6018	4 Units
626-PA-6020	4 Units

NOTE

When selecting modules for installation into any Series 626 Mainframe, verify that the sum of the load ratings of the installed modules DOES NOT exceed 20 Units.

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

2.3 INSTALLATION

To install the 6020 plug-in into the Mainframe:

WARNING

Be sure that the Series 626 Mainframe and all of the power connected to its plug-in modules are first turned OFF before proceeding with any installation.

(1) Remove the 6020 plug-in from its packaging.

(2) Position the top and bottom front corners of the plug-in module into the upper and lower tracks of the desired slot position at the rear of the Series 626 Mainframe.

(3) Carefully slide the module into the Mainframe until it is firmly in position.

(4) Tighten the top and bottom captive screws in order to secure the module to the Mainframe.

2.3.1 Connecting and Positioning the Antenna Unit

The Antenna Unit has a 10-foot cable with an attached 7-pin connector. The connector mates into the Antenna Unit socket on the rear panel of the 6020 plug-in. To connect the Antenna Unit:

(1) Insert the FUNCTION key into the FUNCTION key switch on the front panel of the Mainframe.

(2) Turn the switch to "OFF."

(3) Align the red dot on the Antenna cable connector with the red dot on the plug-in's Antenna Unit socket, and push the connector into the socket until it is firmly in position.

CAUTION

To avoid damaging the equipment, DO NOT connect anything other than the Antenna Unit to the 6020 plug-in, and vice versa.

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

(4) Position the Antenna Unit within a 10-foot radius of the Mainframe's rear panel, ideally, on a horizontal conductive surface.

(5) Connect the short metalic ground strap attached to the Antenna Unit's sensor to the conductive surface (if applicable).

NOTE

The sensor built into the Antenna Unit is designed to be placed on a horizontal conductive surface. The short metalic ground strap should be connected to this conductive surface. Although this connection is not an absolute requirement, not using it will affect the RF field strength measurements.

2.4 OPERATING THE 6020 PLUG-IN

The following subsection contains information on the Series 626's operating controls and indicators used by the 6020 plug-in.

2.4.1 Operating Controls and Indicators

The Series 626 uses a menu-style format for selecting items and thresholds. The functions of the Series 626's operating controls and indicators used by the 6020 plug-in are described in Table 2-2 on the following page. Figure 2-1 on the page after illustrates these controls on a typical front panel of a Series 626 Mainframe. For a description of the controls common to overall Series 626 operation, refer to Volume 1 of the Mainframe manual.

Copyright © 1985, 1986
By Dranetz Technologies, Inc.
All Rights Reserved.

Table 2-2. 6020 Plug-In Operating Controls

ITEM	FUNCTION
Numerical Keyboard*	Allows the selection of menu items
Numerical Keys	Used to enter numerical values for the various functions.
[HI LIMIT] key	When pressed, enables the numerical keyboard to program the RF field strength high limit threshold.
[LO LIMIT] key	When pressed, enables the numerical keyboard to program the burst duration low limit threshold.
[SENS] key	When pressed, enables the numerical keyboard to program the average RF field strength sensitivity threshold.
[BURST SENS] key**	When pressed, enables the numerical keyboard to program the field strength burst sensitivity threshold.
[DATA] push button*	Produces a Data Summary printout when pressed.
[PRESET] push button	With the FUNCTION key switch set at "PROGRAM", and a channel push button [1], [2], [3], [4], or [5] depressed, pressing [PRESET] recalls the non-volatile "Factory Preset" program for that channel.
[ENTER] key	When pressed, transfers the entered numerical value into the 6020 plug-in's main memory.
OTHER FRONT PANEL CONTROLS AND INDICATORS	Refer to Volume 1 of the Mainframe Manual (Operator's Manual).

* -"Key" and "keyboard" represent the red, green, and yellow keys. "Push button" represents the black selector buttons.

** -If your Mainframe does not have a red key labeled "BURST SENS," it is the key directly below the red [HI LIMIT] key.

Copyright © 1985, 1986
By Dranetz Technologies, Inc.
All Rights Reserved.

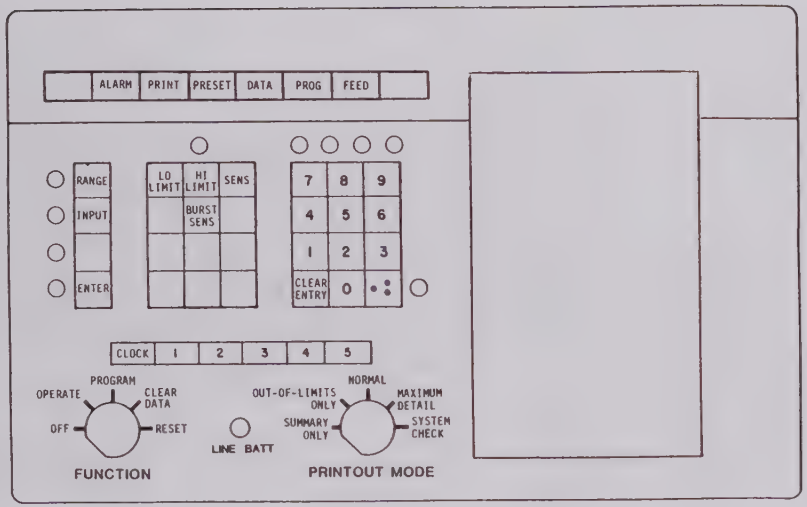


Figure 2-1. Series 626 Controls used by the 6020 Plug-in

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

2.5 PROGRAMMING THE 6020 PLUG-IN

The 6020 plug-in monitors four programmable thresholds:

1) Continuous wave RF field strength high limit,

2) Continuous wave average RF field strength sensitivity,

3) Field strength burst sensitivity, and

4) Burst duration low limit.

2.5.1 Programming Procedure

NOTE

The 6020 plug-in is designed to detect an invalid entry. For Example: The burst sensitivity may be programmed in the range of 1.0 to 8.0 volts/meter. If you try to program a burst sensitivity 9.0 volts/meter, the Series 626 will print the message "ENTRY TOO HIGH." You must then reprogram an acceptable value.

(1) Turn on the Series 626 by turning the FUNCTION key from "OFF" to "OPERATE." To begin programming, turn the FUNCTION key from "OPERATE" to "PROGRAM."

a. A Program Summary for the currently selected channel will be immediately printed.*

(2) Press the channel push button (one through five) corresponding to the slot position of the 6020 plug-in.

NOTE

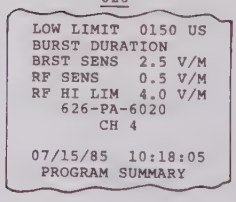
The "Factory Preset" program may be recalled at any time during the PROGRAM MODE. (Refer to subsection 2.6 for more information on the PRESET function.)

a. The red LED above the center bank of keys lights and the Program Summary is printed. An example of a typical Program Summary is (top of next page):

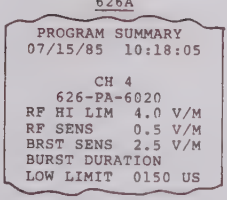
* -If the selected channel is empty, the message "CHANNEL EMPTY" will be printed.

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

626*



626A*



The above printout indicates the time and date of the Program Summary, the channel the plug-in is in, the continuous wave RF field strength high limit threshold, the continuous wave RF field strength sensitivity threshold, the field strength burst sensitivity threshold, and the burst duration low limit threshold.

2.5.1.1 **Programming the RF Field Strength High Limit Threshold**

The RF field strength high limit is the maximum continuous wave (CW) value that the 6020 plug-in will allow before producing a high limit disturbance printout.

a. The red LED above the center bank of keys should be lit.

(1) Press the red [HI LIMIT] key.**

a. The red LED goes out and one yellow LED above the numerical keyboard lights.

(2) Press the numerical keys corresponding to your desired RF field strength high limit. (The decimal point after the first digit, and one digit after the decimal point is required.)

a. For Example: If your desired high limit is 4.0 volts/meter, press [4], [•], [0].

b. The green LED next to the [ENTER] key lights.

* -If you are using a Model 626, read (from the bottom up) the "626" printouts in this manual; if you are using a Model 626A, read (from the top down) the "626A" printouts instead.

** -Numbers and letters shown in brackets "[]" in this manual stand for the individual red, green, and yellow keys.

Copyright © 1985, 1986
By Dranetz Technologies, Inc.
All Rights Reserved.

(3) Press [ENTER].*

a. The entered value is printed.

b. The red LED lights.

2.5.1.2 **Programming the Average RF Sensitivity Threshold**

The average RF sensitivity threshold is the allowable continuous wave (CW) deviation from a latest recorded field strength reading. A detected increase or decrease in the field strength, greater than the average sensitivity, results in a disturbance printout.

a. The red LED above the center bank of keys should be lit.

(1) Press the red [SENS] key.

a. The red LED goes out and one yellow LED over the numerical keyboard lights.

(2) Press the numerical keys corresponding to your desired average RF sensitivity threshold. (The decimal point after the first digit, and one digit after the decimal point is required.)

a. For Example: If your desired average RF sensitivity is 1.0 volts/meter, press [1], [·], [0].

b. The green LED next to the [ENTER] key lights.

(3) Press [ENTER].

a. The entered value is printed.

b. The red LED lights.

2.5.1.3 **Programming the Burst Sensitivity Threshold**

The burst sensitivity is the absolute threshold for the field strength amplitude, above which a disturbance printout is produced.

a. The red LED above the center bank of keys should be lit.

* -Pressing [CLEAR ENTRY] before [ENTER] will clear the current sequence of numerical keys which have been pressed.

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

(1) Press the red [BURST SENS] key.

NOTE

If your Series 626 Mainframe does not have a red key labeled [BURST SENS], it is the key directly below the red [HI LIMIT] key.

a. The red LED goes out and one yellow LED over the numerical keyboard lights.

(2) Press the numerical keys corresponding to your desired burst sensitivity. (The decimal point after the first digit, and one digit after the decimal point is required.)

a. For Example: If your desired burst sensitivity is 3.5 volts/meter, press [3], [.], [5].

b. The green LED next to the [ENTER] key lights.

(3) Press [ENTER].

a. The entered value is printed.

b. The red LED lights.

2.5.1.4 Programming the Burst Duration Low Limit Threshold

The burst duration low limit threshold is the minimum time that a burst must last before being recognized as a disturbance by the 6020 plug-in, and printed by the Series 626.

a. The red LED above the center bank of keys should be lit.

(1) Press the red [LO LIMIT] key.

a. The red LED goes out and one yellow LED over the numerical keyboard lights.

(2) Press the numerical keys (including leading zeroes) corresponding to your desired burst duration low limit threshold.

a. For Example: If your desired burst duration low limit threshold is 50 uS, press [0], [0], [5], [0].

(3) Press [ENTER].

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

a. The entered value is printed.

b. The red LED lights.

2.5.1.5 **Completion of the Programming**

When the 6020 plug-in's programming is completed, you may program another module, by pressing another channel push button, or place the Series 626 on-line by turning the FUNCTION key to "OPERATE." While on-line, you may print the plug-in's current Program Summary by simply pressing the black [PROG] push button (while the proper channel push button is depressed).

2.6 SELECTING THE "FACTORY PRESET" PROGRAM

To select the "Factory Preset" program, proceed as follows:

(1) Turn the FUNCTION key to "PROGRAM."

a. A Program Summary for the currently selected channel is immediately printed.* If the 6020 plug-in is in this channel, go to step (3).

(2) Press the channel push button (one through five) corresponding to the slot position of the 6020 plug-in.

a. The channel's Program Summary is immediately printed.

(3) Press the black [PRESET] push button.

a. The "Factory Preset" program is recalled from memory.

b. A new Program Summary indicating the "Factory Preset" values is printed. An example of this printout is:

626

```
LOW LIMIT  Ø1ØØ US
BURST DURATION
BRST SENS  2.0 V/M
RF SENS    1.0 V/M
RF HI LIM  3.0 V/M
   626-PA-6020
       CH 4

07/15/85  10:44:30
  PROGRAM SUMMARY
```

626A

```
  PROGRAM SUMMARY
07/15/85  10:44:30

       CH 4
   626-PA-6020
RF HI LIM  3.0 V/M
RF SENS    1.0 V/M
BRST SENS  2.0 V/M
BURST DURATION
LOW LIMIT  Ø1ØØ US
```

* -If the selected channel is empty, the message "CHANNEL EMPTY" is printed.

Copyright © 1985, 1986
By Dranetz Technologies, Inc.
All Rights Reserved.

2.7 POSSIBLE DISTURBANCE PRINTOUTS

Whenever a disturbance is detected by the 6020 plug-in, it is immediately classified and stored or printed by the Series 626. The following subsections contain the possible disturbance printouts.

2.7.1 RF Field Strength High Limit Disturbance Printout

Whenever the monitored continuous wave electrical field exceeds the programmed upper limit, a disturbance message is printed. An example of the printed message is:

```
4 HIGH 12:34:14.78
```

In the above printout, "4" is the channel number, "HIGH" represents the category of disturbance (RF field strength high limit), and time is given in hours, minutes, and seconds (accurate to the .01 second).

When the monitored continuous wave electrical field returns to within "normal" limits, a message such as the following is printed:

626

```
4 NORM 12:34:14.80
4.7 V/M MAX
```

626A

```
4.7 V/M MAX
4 NORM 12:34:14.80
```

The above printout indicates that the electrical field returned to "normal" (within programmed limits) at the time indicated. It also indicates the maximum RF field strength achieved: 4.7 volts/meter.

2.7.2 RF Field Strength Deviation Printout

An RF field strength deviation printout occurs whenever the monitored continuous wave electrical field deviates by more than the programmed average RF sensitivity from the latest recorded reading. Below is an example of two RF field strength deviation printouts. In the top printout, the electrical field increased to 5.4 volts/meter at the time shown; in the second, the field decreased to 4.3 volts/meter at the time shown.

626

```
4 INC  01:02:34.56
5.4 V/M

4 DEC  01:02:34.63
4.3 V/M
```

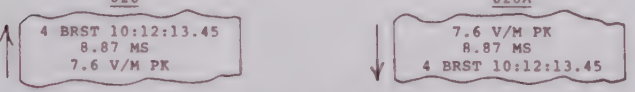
626A

```
5.4 V/M
4 INC 01:02:34.56

4.3 V/M
4 DEC 01:02:34.63
```

Copyright © 1985, 1986
By Dranetz Technologies, Inc.
All Rights Reserved.

2.7.3 "Burst" Disturbance Printout

"Burst" disturbances are any electrical fields present for a short period of time (1 microsecond to 10 milliseconds). An example of a burst disturbance printout is:

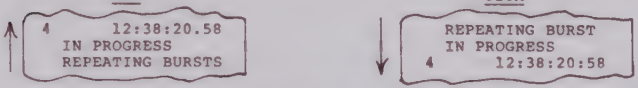


The above printout indicates that a burst of electrical field with a peak magnitude of 7.6 volts/meter and lasting 8.87 milliseconds occurred at the time shown.

2.7.4 Repeating "Bursts" Disturbance Printout

Although bursts usually occur at random, there are times when they are cyclical in nature. For Example: A switching power supply creates a burst of energy every time it switches. If the field levels produced by the switchings are high enough, a disturbance printout will occur during each 20-millisecond monitoring period.

Such a case would cause excessive use of the thermal paper, and is thus unsuitable for long-term monitoring periods. To remedy this problem, a message is printed whenever bursts are recorded in more than four successive 20-millisecond monitoring periods. An example of such a message is:



The above printout indicates the channel number and time of the repeating bursts.

The 6020 plug-in will continue to transparently monitor all of the bursts until it has detected that they have stopped for at least two seconds. A message will then be printed indicating that the bursts have subsided, and the most severe burst detected during the transparent monitoring. An example of such a printout is:

Copyright © 1985, 1986
By Dranetz Technologies, Inc.
All Rights Reserved.

On some occasions, the paper tape display may have just recently been torn off in order to analyze the data. If this is the case, and you would like to check if the unit is operating in the REPEATING BURSTS MODE, simply press the black [DATA] push button. A Data Summary printout will occur. If the unit is operating in the REPEATING BURSTS MODE, a "BRST REPETITIVE" message will be printed in the Data Summary.

2.8 VARIOUS PRINTOUT MODES

The setting of the PRINTOUT MODE key switch on the front panel of the Series 626 Mainframe determines the amount of detail which is printed from any disturbance. The farther counter-clockwise the key is turned, up to the SYSTEM CHECK position, the less detail is printed regarding a disturbance. Below is a list of the four key switch positions, and the amount of detail printed when the PRINTOUT MODE key is in each position.

SUMMARY ONLY

The Series 626 printer is inhibited. All data acquired by the 6020 plug-in is stored in the Series 626's daily accumulator. The daily summary is then printed at midnight (Series 626 time), or when the black [DATA] push button is pressed.

OUT-OF-LIMITS-ONLY

Disturbance data is ONLY printed when the disturbance is recorded as out-of-limits (the averaged sensitivity deviations such as increases and decreases are not printed).

NORMAL

A moderately detailed printout of any disturbances recorded by the 6020 plug-in is printed.

MAXIMUM DETAIL

A highly detailed printout of any disturbances recorded by the plug-in is printed.

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

SECTION III
OPERATIONAL TEST

3.1 GENERAL

This section describes the procedure used for verifying the 6020 plug-in's operation.

3.2 PURPOSE OF THE SYSTEM CHECK

When the SYSTEM CHECK is performed, a source of signals is applied to the plug-in's Antenna Unit circuitry. These signals fully verify the plug-in's operational integrity. The signals and their allowable tolerance levels are described in subsection 3.3.1. During a SYSTEM CHECK, the Antenna Unit will still be connected and continues to monitor the electrical field. Any electrical field present when the SYSTEM CHECK is performed adds to the SYSTEM CHECK signal.

3.3 PERFORMING THE SYSTEM CHECK

To perform the SYSTEM CHECK routine:

(1) Turn the FUNCTION key to "OPERATE."

(2) Turn the PRINTOUT MODE key momentarily to "SYSTEM CHECK," and then back to "NORMAL."

NOTE

On some older models of the Series 626's front panel, "SYSTEM CHECK" may instead read "CALIBRATE."

SYSTEM CHECK Printouts within Tolerances
If the numerical values printed during the SYSTEM CHECK are within the tolerances of subsection 3.3.1, the 6020 plug-in is operating properly.

SYSTEM CHECK Printouts below Low Limit Tolerances
If either numerical value printed during the SYSTEM CHECK is below its low limit tolerance (2.5 V/M for Burst and Present RF), the plug-in is defective. In this case, contact the Dranetz Service Corp. for further instructions (refer to subsection 1.9).

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

SYSTEM CHECK Printouts above High Limit Tolerances

If either numerical value printed during the SYSTEM CHECK is above its high limit tolerance (5.0 V/M for burst and 4.5 V/M for Present RF), perform the following:

(a) Press the black [DATA] push button in order to obtain a Data Summary printout.

(b) Compare the Present RF shown in the Data Summary to the out-of-tolerance Present RF shown in the SYSTEM CHECK.

--If the Present RF of the Data Summary is greater than 1.0 V/M, the plug-in is most likely operating properly. (The out-of-tolerance Present RF is being caused by excessive ambient, and the out-of-tolerance Burst is being caused by a burst signal in the vacinity adding to the SYSTEM CHECK signals.) To further verify, however, re-try the SYSTEM CHECK, or, if possible, move the plug-in to an area of less ambient and free of burst signals, and then re-try the SYSTEM CHECK.

--If the Present RF of the Data Summary is less than 1.0 V/M, the unit may be operating improperly and you should contact the Dranetz Service Corp. for further instructions (refer to subsection 1.9).

3.3.1 System Check Signals and Tolerances

Signals	Tolerances
Burst: 3.5 V/M	Burst: 2.5 to 5.0 V/M
Present RF: 3.5 V/M	Present RF: 2.5 to 4.5 V/M

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

APPENDIX A

A.1 DIFFERENCE BETWEEN A BURST DISTURBANCE AND AN RF FIELD STRENGTH HIGH LIMIT (CW) DISTURBANCE

In general, an RF field strength high limit disturbance occurs whenever the maximum continuous wave (CW) value that the 6020 plug-in is programmed for is exceeded. A burst disturbance occurs whenever the programmed absolute threshold for the field strength amplitude is exceeded.

6020 Plug-in's Signal Processing Techniques

The RF voltage measured at the plug-in's antenna is fed to its envelope detector. The envelope detector removes the high frequency components and sends a dc-to-1MHz signal back to the plug-in. The signal is then simultaneously measured by a peak detector and an integrator. The peak detector holds the peak value of the electric field long enough to be recorded as a Burst disturbance by the Mainframe. Duration and peak amplitude are recorded within the event description. The integrator is used to average the electric field strength over a 20 millisecond interval. The integrator output is read every 20 milliseconds by the Mainframe, and compared with the programmed High Limit to determine if a High Limit (CW) disturbance has occured.

Examples

The following two examples clarify the relationship between the peak detector (Burst disturbance) and the integrator (High Limit disturbance). (Assume a programmed Burst threshold of 3.9 V/M, and a High Limit of 0.7 V/M.)

Ex. (1) If a burst occurs with RF field strength peak amplitude of 6 volts/meter, duration of 1000 microseconds, and a "square" envelope, the peak detector would report a Burst with an amplitude of 6.0 V/M (>3.9 V/M threshold), and a duration of 1000 uSec. The integrator would then average this Burst over 20 milliseconds and report an average of:

$$A = \text{Avg Field Strength}$$

$$= \frac{(\text{amplitude}) \times (\text{duration})}{(20\ \text{mSec})}$$

Comment: bh is the area of a square env.

$$= \frac{(6.0\ \text{V/M}) \times (1000\ \text{uSec})}{(20\ \text{mSec})}$$

$$= 0.3\ \text{V/M}$$

Because the integrator's output of 0.3 V/M is less than the programmed High Limit (0.7 V/M), no High Limit disturbance is reported, although the Burst disturbance was recorded.

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

Ex. (2) If a burst occurs with RF field strength peak amplitude of 4 volts/meter, duration of 8000 microseconds, and a "triangular" envelope, the peak detector would report a Burst with an amplitude of 4.0 V/M and a duration of 8000 uSec. The integrator would then average this Burst over 20 milliseconds and report an average of:

A = Avg Field Strength

$$= \frac{(0.5) \times (\text{amplitude}) \times (\text{duration})}{(20\ \text{mSec})}$$

Comment: ½bh is the area of a triangle env.

$$= \frac{(0.5) \times (4.0\ \text{V/M}) \times (8000\ \text{uSec})}{(20\ \text{mSec})}$$

$$= 0.8\ \text{V/M}$$

Because the integrator's output of 0.8 V/M exceeds the programmed High Limit (0.7 V/M), a High Limit disturbance is reported (in addition to the reported Burst disturbance), accompanied by the limit crossing times.

Copyright © 1985
By Dranetz Technologies, Inc.
All Rights Reserved.

WARNING

Because of possible shock or fire hazards, connection of this instrument should be performed in compliance with the National Electric Code (ANSI C1) or any other requirements, or both, which may be applicable to the user.

Installation, operation, and maintenance should only be performed by qualified personnel.

TM-111960-G1

VOLUME 1 -- OPERATOR'S MANUAL

626-PA-6024A

THREE-PHASE AC VOLTAGE HARMONIC ANALYZER

15 June 1986

See opposite side relative to proprietary rights.

Note: Refer to Volume 2 (Service Manual) of TM-111960-G1 for maintenance information.

© Copyright 1986
Dranetz Technologies, Inc.
All Rights Reserved.

DRANETZ

DRANETZ TECHNOLOGIES, INC.
1000 New Durham Rd., PO Box 4019
Edison, New Jersey 08818-4019

NOTICE REGARDING DRANETZ' PROPRIETARY RIGHTS

This publication contains information proprietary to Dranetz Technologies, Inc. By accepting and using this manual, the user agrees that the information contained herein will be used solely for the purpose of repairing or operating equipment of Dranetz Technologies, Inc. These manuals are to be returned to Dranetz Technologies,, Inc. when no longer required by the user, or when there is a change in ownership of the equipment.

These publications are protected under the Copyright laws of the United States Title 17 et seq. No part of this publication may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language or computer language, in any form, by any means, electronic, mechanical, magnetic, optical, chemical, manual, or otherwise, without the prior written permission of Dranetz Technologies, Inc., 1000 New Durham Road, PO Box 4019, Edison, New Jersey 08818-4019.

Table of Contents (Page 1 of 3)

Section		Page
I	**GENERAL INFORMATION**	1-1
	Subsection	
	1.1 SCOPE	1-1
	1.2 INTRODUCTION	1-1
	1.3 PURPOSE	1-1
	1.4 EQUIPMENT CHARACTERISTICS	1-2
	1.5 APPLICATIONS	1-3
	1.6 MEASUREMENT CAPABILITIES	1-3
	1.6.1 General	1-3
	1.6.2 Definition of Total Harmonic Distortion	1-3
	1.6.3 General Operational Description	1-4
	1.6.3.1 Sampling	1-4
	1.6.3.2 Computation	1-4
	1.6.3.3 Analysis	1-4
	1.6.3.4 Sync Lost Condition	1-4
	1.7 STANDARD ACCESSORIES	1-5
	1.8 OPTIONAL ACCESSORIES	1-5
	1.9 FACTORY REPAIR	1-5
II	**INSTALLATION AND OPERATION**	2-1
	Subsection	
	2.1 GENERAL	2-1
	2.2 LOAD RATINGS	2-1
	2.3 INSTALLING THE PLUG-IN INTO THE MAINFRAME	2-2
	2.4 CONNECTING POWER SOURCE TO THE MODULE	2-2
	2.4.1 Input Connection Instructions	2-2
	2.4.2 Circuit Applications	2-3

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

Table of Contents (Page 2 of 3)

Section		Page
II (Cont'd)		
	Subsection	
	2.5 OPERATING THE 6024A PLUG-IN	2-5
	2.5.1 Operating Controls and Indicators	2-5
	2.5.2 Programmable Limits and Thresholds	2-7
	2.5.3 Programming Procedure	2-7
	2.5.3.1 Programming all Channels Simultaneously	2-7
	2.5.3.2 Programming a Single Channel	2-8
	2.5.4 Selecting Factory Preset Values for the Plug-in	2-9
	2.6 DESCRIPTION OF DATA PRINTOUTS	2-10
	2.6.1 INCrease Printouts	2-10
	2.6.2 DECrease Printouts	2-10
	2.6.3 High Distortion Printouts	2-11
	2.6.4 Normal Distortion Printouts	2-11
	2.6.5 Miscellaneous Printouts	2-11
	2.6.6 Data Summary Printouts	2-12
	2.6.7 Daily Summary Printouts	2-14
	2.7 VARIOUS PRINTOUT MODES	2-14
III	**OPERATIONAL TEST**	3-1
	Subsection	
	3.1 GENERAL	3-1
	3.2 SYSTEM CHECK	3-1
	3.2.1 System Check Tolerances	3-1
	3.2.2 Example System Check Printout	3-2

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

Table of Contents (Page 3 of 3)

List of Tables

Table		Page
1-1	6024A Plug-in Technical Specifications	1-2
2-1	Load Ratings	2-1
2-2	6024A Plug-in Operating Controls	2-5
2-3	Miscellaneous Printout Messages	2-12
3-1	System Check Tolerance Ranges	3-1

List of Illustrations

Figure		Page
2-1	Line-to-Neutral (Four-Wire) Input Connections	2-4
2-2	Line-to-Line (Three-Wire) Input Connections	2-4
2-3	Separate Sources Input Connections	2-4
2-4	Series 626 Controls used by the 6024A Plug-in	2-6

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

STATEMENT OF WARRANTY

ALL PRODUCTS OF DRANETZ TECHNOLOGIES, INC. ARE WARRANTED TO THE ORIGINAL PURCHASER AGAINST DEFECTIVE MATERIAL AND WORKMANSHIP FOR A PERIOD OF ONE YEAR FROM THE DATE OF DELIVERY. DRANETZ WILL REPAIR OR REPLACE, AT ITS OPTION, ALL DEFECTIVE EQUIPMENT RETURNED, FREIGHT PREPAID, DURING THE WARRANTY PERIOD, WITHOUT CHARGE FOR REPAIR, PROVIDED THERE IS NO EVIDENCE THAT THE EQUIPMENT HAS BEEN MISHANDLED OR ABUSED. THIS WARRANTY SHALL NOT APPLY TO ANY DEFECTS RESULTING FROM IMPROPER OR INADEQUATE MAINTENANCE, BUYER-SUPPLIED HARDWARE/SOFTWARE OR INTERFACING, UNAUTHORIZED MODIFICATION OR MISUSE OF THE EQUIPMENT, OPERATION OUTSIDE OF THE ENVIRONMENTAL SPECIFICATIONS FOR THE PRODUCT, OR IMPROPER SITE PREPARATION OR MAINTENANCE.

The information in this manual has been reviewed and is believed to be entirely reliable. No responsibility, however, is assumed for any inaccuracies. The material in this manual is for information purposes only, and is subject to change without notice.

VOLUME 1
OPERATOR'S MANUAL

626-PA-6024A THREE-PHASE AC VOLTAGE HARMONIC ANALYZER

SECTION I
GENERAL INFORMATION

1.1 SCOPE

The manual for this product consists of two volumes. Volume 1, the Operator's manual, is divided into three sections: (I) GENERAL INFORMATION, (II) INSTALLATION AND OPERATION, and (III) OPERATIONAL TEST. Volume 2, the Service manual, contains the maintenance instructions and consists of four sections, IV through VII. (See Volume 2 for a description of these sections.)

1.2 INTRODUCTION

Volume 1 of this manual provides Operator's instructions for the 626-PA-6024A Three-Phase AC Voltage Harmonic Analyzer plug-in module, also referred to as the 6024A plug-in. The 6024A plug-in is intended for use in a Series 626 Mainframe. Before reading these instructions further, you should be familiar with the information described in the Mainframe manual.

1.3 PURPOSE

The 6024A monitors harmonic distortion of voltage waveforms on three-phase ac power lines. Voltage applied to the input channels may range from 50 to 600 V rms, with a maximum crest factor of 2, over a frequency range of 47 to 63 Hz. The plug-in reports disturbances when the total harmonic distortion (THD) of any channel exceeds a programmable threshold. It also reports a disturbance when the THD changes as much as the programmed sensitivity.

Disturbance printouts include the percentage of THD, root-mean-square (rms) voltage at the fundamental frequency, and values for each harmonic up to and including the seventh expressed as a percentage of the fundamental. Three separate channels are provided, with all measurements synchronized to channel A. THD thresholds and sensitivities may be separately programmed for each channel.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

1.4 EQUIPMENT CHARACTERISTICS

The 6024A is configured as a plug-in module 6.5" high by 1.25" wide by 10.25" deep. It may be installed in any one of five slots of the Series 626 Mainframe. Technical specifications of the 6024A are presented in Table 1-1.

Table 1-1. 6024A Plug-in Technical Specifications

WARNING

DO NOT exceed ac voltage of 600 V rms, referenced to safety ground, to input terminals marked "+" or "-" on the rear panel.

Input connections:	9-position barrier block with terminals for three separate channels (two high impedance inputs plus a safety ground for each channel)
Input Impedance:	40 Megohms, each side to ground
Input Voltage Range:	50 to 600 V rms
Maximum Crest Factor:	2
Input Frequency Range:	47 to 63 Hz fundamental
THD High Limit: (user-progammable)	1% to 25% THD
THD Sensitivity: (user-programmable)	1% to 25% THD
THD Measurement Resolution:	0.1% THD
THD Measurement Accuracy:	±5% of reading, ±1%
Fundamental Measurement Resolution:	0.1V rms
Fundamental Measurement Accuracy:	±1% of reading, ±0.2% F.S.
Harmonic Measurement Resolution:	0.1% of fundamental voltage
Harmonic Measurement Accuracy:	±5% of reading, ± 1%

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

1.5 APPLICATIONS

When installed in the Mainframe, the 6024A plug-in monitors changes in the total harmonic distortion present in the voltage waveform on ac power lines. Among the typical applications are:

-- Verifying that the harmonic content in the ac power supplied to sensitive equipment (such as computers) is within manufacturer's specifications.

-- Determining if electrical components (such as transformers and inductors) are being stressed due to power dissipation at harmonic frequencies.

1.6 MEASUREMENT CAPABILITIES

1.6.1 General

The 6024A plug-in operates by measuring the total harmonic distortion (THD) of the signals applied to its inputs, and generating printouts based on changes in the measured THD. Along with THD values, the plug-in also provides values for the amplitude of the fundamental plus the relative levels of the second through the seventh harmonics. The amplitude of the fundamental is expressed as root-mean-square (rms) voltage. The relative levels of the second through seventh harmonics are expressed as percentages of the fundamental.

1.6.2 Definition of Total Harmonic Distortion

Values for THD are calculated according to the following definition:

$$THD = 100 * \left(\frac{[\text{sum of squares of rms amplitudes of 2nd through 7th harmonics}]^{\frac{1}{2}}}{[\text{rms amplitude of the fundamental}]} \right)$$

In words, the total harmonic distortion as measured by the 6024A plug-in is defined as the value equal to 100 times the ratio of the square root of the sum of the squares of the root-mean-square amplitudes of the individual harmonics up to and including the seventh, to the root-mean-square amplitude of the fundamental. This is NOT the same as the sum of the relative levels of the harmonics.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

1.6.3 General Operational Description

While in the Operate Mode, the 6024A plug-in performs approximately seven measurements per second. Each measurement consists of three parts: sampling, computation, and analysis. At the end of each measurement, any disturbances detected will be processed for printing, summary information will be updated, and new present values will be made available.

1.6.3.1 Sampling

The voltages applied to the module's inputs are sampled 32 times per ac cycle over four consecutive ac cycles. The samples for all four ac cycles are then averaged, resulting in 32 samples per channel upon which all calculations are based. The sampling period is synchronized to the Phase A input.

1.6.3.2 Computation

The rms amplitudes for all frequency components from the fundamental to the seventh harmonic are calculated using a discrete fourier transform (DFT). These rms values are then used to calculate the THD and the levels of the individual harmonics relative to the fundamental.

1.6.3.3 Analysis

The new THD value is compared with the THD from the previous measurement to determine the amount of change. If the change was equal to or greater than the programmed THD sensitivity, an INCrease or DECrease is reported. The THD value is also compared with the programmed THD high limit to determine if an out-of-limits condition exists. If the new THD value is higher than the THD high limit, and the THD from the previous measurement cycle was not, a "high" disturbance is reported. In subsequent measurements, as long as the THD remains above the THD high limit, the plug-in will keep track of the highest THD value achieved and the duration of the out-of-limits condition (up to 652.8 seconds).

When the THD returns to a level within limits, the plug-in will report that the distortion has returned to normal, the highest THD value achieved while out-of-limits, and the duration of the out-of-limits condition (within 0.1 seconds).

1.6.3.4 Sync Lost Condition

The plug-in can detect changes in the fundamental frequency of the signal used for synchronization. If frequency changes are detected during sampling, the plug-in will report a "SYNC LOST" condition, and no further measurements will be taken until four consecutive cycles occur with no change in frequency. When a steady-state condition is established, the plug-in will report "SYNC RESTORED" and continue its normal monitoring operation.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

1.7 STANDARD ACCESSORIES

Part #	Quantity	Description
TM-111960-G1 Vol. 1	1	Operator's Manual

1.8 OPTIONAL ACCESSORIES

Part #	Quantity	Description
TM-111960-G1 Vol. 2	1	Service (Maintenance) Manual

1.9 FACTORY REPAIR

When factory repair is required, proceed as follows:

1. Contact Dranetz Service Corporation (formerly Dranetz Technologies, Inc., Customer Service Dept.) in order to obtain an authorization number for factory repair.

   Telephone No: (201) 755-7081 Telex: 499-7808

   TWX: (710) 997-9553 Cable: DRANETZ

2. Fill out the REPAIR/SERVICE ORDER form enclosed in the Series 626 Operating manual. Ship it along with the equipment to Dranetz Service Corporation. (If this form is missing, contact Dranetz Service Corp. for a replacement form.)

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

SECTION II
INSTALLATION AND OPERATION

2.1 GENERAL

This section contains the installation, programming, and operating instructions for the 6024A plug-in.

2.2 LOAD RATINGS

The Series 626 standard Mainframe has an upper limit of the combined total rating of its installed modules. The overall Mainframe capacity is set at 20 units. The individual modules (existing as of this printing) have the following load ratings:

Table 2-1. Load Ratings

Plug-in	Load Rating
626-PA-6001	2 Units
626-PA-6001 with extra option bd.	3 Units
626-PA-6002	2 Units
626-PA-6003	4 Units
626-PA-6005	2 Units
626-PA-6006	2 Units
626-PA-6007	1 Unit
626-PA-6008	2 Units
626-PA-6009	4 Units
626-PA-6011	1 Unit
626-PA-6012	2 Units
626-PA-6012A	3 Units
626-PA-6013	2 Units
626-PA-6014	1 Unit
626-PA-6015	4 Units
626-PA-6018	4 Units
626-PA-6020	4 Units
626-PA-6024A	4 Units
626-PA-6024B	4 Units
626-PA-6030	6 Units

NOTE

When selecting modules for installation into any Series 626 Mainframe, verify that the sum of the load ratings of the installed modules DOES NOT exceed 20 units.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

2.3 INSTALLING THE PLUG-IN MODULE INTO THE MAINFRAME

To install the 6024A plug-in into the Mainframe:

WARNING

Be sure that the Series 626 Mainframe and all of the power connected to its plug-in modules are first turned OFF before proceeding with any installation.

(1) Remove the 6024A plug-in from its packaging.

(2) With the rear panel markings of the module reading correctly, carefully slide the module into the upper and lower card-guide tracks of the desired slot until it is firmly seated.

(3) Tighten the top and bottom captive screws to secure the module into the Mainframe.

2.4 CONNECTING POWER SOURCE TO THE MODULE

CAUTION

To avoid damaging the equipment, DO NOT apply ac voltages in excess of 600 V rms to any ac phase input (A, B, or C) of the 6024A plug-in.

WARNING

Because of possible shock or fire hazards, connection of this instrument should be performed in compliance with the National Electric Code (ANSI C1), or any other requirements, or both, which may be applicable to the user.

Installation, operation, and maintenance should only be performed by qualified personnel. Your qualifications for doing so should be self-determined.

2.4.1 Input Connection Instructions

The 6024A plug-in is equipped with a nine position barrier block, providing separate inputs for three channels labeled "PHASE A," "PHASE B," and "PHASE C." All measurements are synchronized to Phase A; if only one or two of the channels are used, Phase A must be connected. For each channel, three screw terminals are provided labeled "+," "-," and "⏚." The "+" and "-" terminals are high impedance voltage inputs; the "⏚" terminal is internally connected to safety ground.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

NOTE

For single-phase lines or three-phase "Wye" configurations, it is recommended that the "+" inputs be connected to ac line or "hot" conductors, and the "-" inputs be connected to ac neutral conductors. The proper connection procedure is given below.

(1) Turn the Mainframe off by inserting the key into the FUNCTION key switch on the front panel and setting the switch to "OFF." Unplug the Mainframe from the power source.

(2) Turn off the power source(s) to be monitored by the module.

(3) First, make all connections to the 6024A plug-in barrier block. Then be sure to replace the barrier block cover.

WARNING

DO NOT proceed until the barrier block cover is replaced.

(4) Make the desired connections to the power source(s) to be monitored.

(5) Plug the Mainframe back into the power source. Turn on the Mainframe by turning the FUNCTION key switch to "OPERATE."

(6) Turn on the power source(s) to be monitored.

2.4.2 Circuit Applications

WARNING

Conductors connecting to measurement points should be approved for the specific use. When connected to branch circuits of 20 amperes or less, the minimum flexible cord size is No. 18 AWG (1 mm square). For branch circuits with higher ampacity, refer to National Electric Code (ANSI C1-1975), paragraphs 240-4 and 250-95. Special consideration of ground may be required. (Refer to Article 250 of above reference if in doubt.) Outside of the United States, consult the applicable safety standards.

The 6024A may be used to monitor harmonic distortion on three-phase four-wire (Wye), three-phase three-wire (Delta), or three separate power lines. Figures 2-1, 2-2, and 2-3 illustrate proper connections for all recommended applications.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

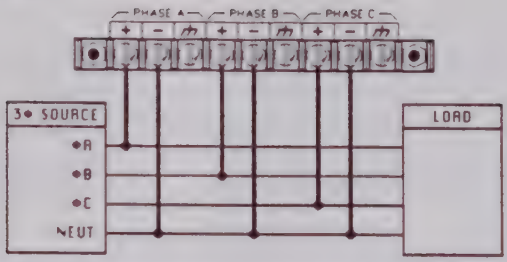


Figure 2-1. Line-to-Neutral (Four-Wire) Input Connections

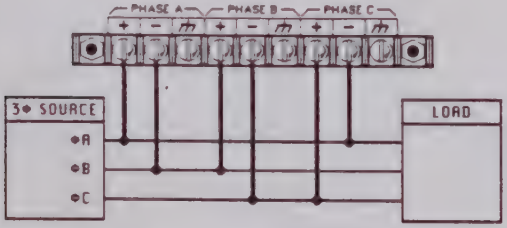


Figure 2-2. Line-to-Line (Three-Wire) Input Connections

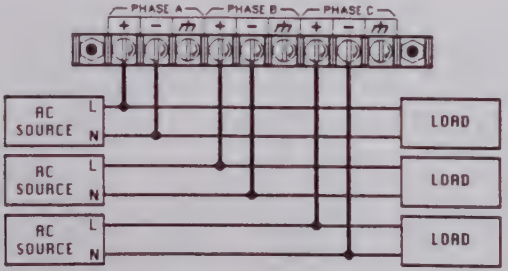


Figure 2-3. Separate Sources Input Connections

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

2.5 OPERATING THE 6024A PLUG-IN

2.5.1 Operating Controls and Indicators

The functions of the Mainframe operating controls and indicators associated with the 6024A plug-in are described in Table 2-2. Figure 2-4 shows a typical front panel of a Mainframe and its controls associated with the 6024A plug-in. For a description of controls common to overall Series 626 operation, refer to Volume 1 of your Mainframe manual.

Table 2-2. 6024A Plug-in Operating Controls

ITEM	FUNCTION
Numerical Keys*	Used to enter numerical values for the various functions.
[HI LIMIT] Key	When pressed in Program Mode while the red LED above the red keys is lit, this key enables the unit to accept a new value for the THD high limit.
[SENS] Key	When pressed in the Program Mode while the red LED above the red keys is lit, this key enables the unit to accept a new value for THD high limit.
[INPUT] Key	When pressed in Program Mode, this key initiates the programming for a single channel.
[ENTER] Key	When pressed, transfers the entered numerical value into the plug-in's non-volatile memory and checks for errors.
[CLEAR ENTRY] Key	When pressed in the Program Mode while entering a new value, cancels the current entry.
[PROG] Button*	When pressed in the Operate Mode, produces a Program Summary printout. Also active in the Program Mode while the INPUT LED is lit.
[DATA] Button	When pressed in the Operate Mode, produces a Data Summary printout along with the present values measured from the inputs.
[PRESET] Button	When pressed in the Program Mode, programs all three channels with their factory preset values.

* -"Key" and "Keyboard" represent the red, green, and yellow keys; "Button" represents the black selector buttons.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

Figure 2-4. Series 626 Controls used by the 6024A Plug-in

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

2.5.2 Programmable Limits and Thresholds

The 6024A plug-in generates disturbance printouts based on comparison of the measured THD with two user-programmable parameters: THD high limit and THD sensitivity. The module will report an out-of-limits condition when the measured THD exceeds the programmed THD high limit; it will report an INCrease or DECrease when the THD changes as much as or more than the THD sensitivity.

The THD high limit should be set to the maximum percentage value of the total harmonic distortion considered acceptable for the power line being monitored. The THD sensitivity should be set so that the module will report significant changes in THD without generating extraneous data.

2.5.3 Programming Procedure

Typically, new values for THD high limit and sensitivity are set for all three channels at once; however, individual channels may also be programmed separately.

2.5.3.1 Programming all Channels Simultaneously

The clearest way of explaining the simultaneous programming is through an example. Assume that for all three channels:

a. THD greater than 5% is out-of-limits,

b. Changes in THD of 2% or more should be recognized.

To program the 6024A plug-in with these values:

(1) Set the FUNCTION key switch to "PROGRAM."

(2) Press the channel button (1-5) corresponding to the slot position of the 6024A plug-in. Note that a Program Summary for that channel is immediately printed.

(3) The red LED above the red key group lights, indicating that one of the parameters from this group may be selected. For the 6024A plug-in, only the [HI LIMIT] and [SENS] keys are active. For the purposes of this example, set the high limit first by pressing [HI LIMIT].

(4) Two yellow LEDs above the yellow key group light, indicating that a 2-digit value is expected, representing the THD high limit percentage. For this example (5%), press [0], [5].*

(5) The green LED next to the [ENTER] key will light. Press [ENTER]. The message "THD HILIM 005%" will be printed to confirm the newly programmed value.

---

* If an incorrect entry is made, press [CLEAR ENTRY] and begin over.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

(6) The red LED above the red key group lights, indicating that another parameter may now be selected. Press [SENS].

(7) Two yellow LEDs above the yellow key group light, indicating that a 2-digit value is expected, representing the THD sensitivity percentage. For this example (2%), press [0], [2].

(8) The green LED next to the [ENTER] key will light. Press [ENTER]. The message "THD SENS 002%" will be printed to confirm the newly programmed value.

2.5.3.2 Programming a Single Channel

As with the previous subsection, the clearest way of explaining single channel programming is through an example. Assume that for Phase C only the following is desired:

a. THD greater than 7% is out-of-limits,

b. Changes in THD of 3% or more should be recognized.

To program the 6024A plug-in with these values for Phase C:

(1) Set the FUNCTION key switch to "PROGRAM."

(2) Press the channel button (1-5) corresponding to the slot position of the 6024A plug-in. Note that a Program Summary for that channel is immediately printed.

(3) The red LED above the red key group lights, indicating that one of the parameters from this group may be selected. DO NOT press one of the indicated keys (keys with lit LEDs next to them); instead, press [INPUT].

(4) One yellow LED above the yellow key group lights, indicating that a 1-digit choice is expected. Pressing [1], [2] or [3] will select Phase A, Phase B, or Phase C, respectively. For this example (Phase C), press [3].

(5) The red LED above the red key group lights, indicating that one of the parameters from this group may be selected. Press [HI LIMIT].

(6) Two yellow LEDs above the yellow key group light, indicating that a 2-digit value is expected, representing the THD high limit percentage. For this example, press [0], [7].

(7) The green LED next to the [ENTER] key will light. Press [ENTER]. The message "PHC THD HILIM 007%" will be printed to confirm the newly programmed value.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

(8) The red LED above the red key group should be lit. To program the THD sensitivity, first press [INPUT].

(9) Press [3] to select Phase C.

(10) Press [SENS].

(11) Press [0], [3].

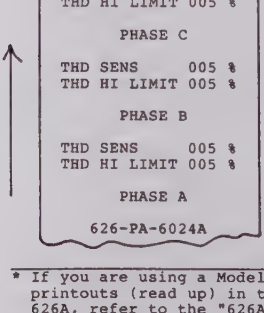
(12) Press [ENTER]. The message "PHC THD SENS 003%" will be printed to confirm the newly programmed value.

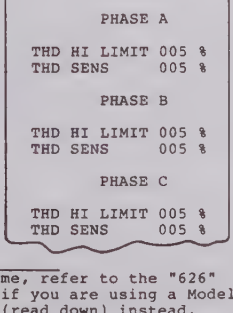
If an attempt is made to enter values outside the allowable ranges specified in Table 1-1, the message "ENTRY TOO HIGH" or "ENTRY TOO LOW" will be printed and new values must be entered.

When the plug-in's programming is completed, another plug-in may be selected for programming by pressing the appropriate channel. When all plug-ins in the unit have been programmed as desired, the Operate Mode may be selected by turning the FUNCTION key switch to "OPERATE.".

2.5.4 Selecting Factory Preset Values for the Plug-in

When the LED above the red key group is lit, the [PRESET] button may be pressed to cause all three channels to be programmed with factory preset values. A Program Summary, indicating the preset values, will then be printed. An example of such a printout follows:





* If you are using a Model 626 Mainframe, refer to the "626" printouts (read up) in this manual; if you are using a Model 626A, refer to the "626A" printouts (read down) instead.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

2.6 DESCRIPTION OF DATA PRINTOUTS

While in the "Operate" Mode, the 6024A plug-in may produce four types of disturbance related printouts:

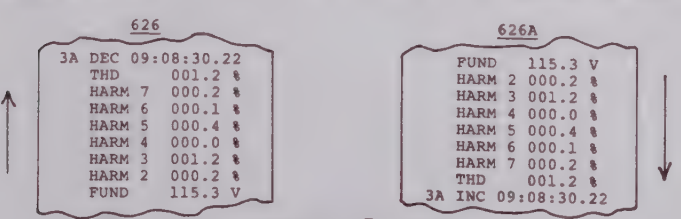
-- INCreases,
-- DECreases,
-- High distortion, and
-- Normal distortion.

2.6.1 INCrease Printouts

An INCrease printout indicates that the THD has increased by an amount equal to or greater than the programmed THD sensitivity. The printout includes the Mainframe's slot number (1-5), the channel phase letter (A, B, or C), the message "INC," the time of the occurrence (within 0.01 seconds), the new THD value, the fundamental amplitude in volts rms, and the relative levels of the second through seventh harmonics. An example of an INCrease printout appears below.

2.6.2 DECrease Printouts

A DECrease printout indicates that the THD has decreased by an amount equal to or greater than the programmed THD sensitivity. The printout includes the Mainframe slot number (1-5), the channel phase letter (A, B, or C), the message "DEC," the time of occurrence (within 0.1 seconds), the new THD value, the fundamental amplitude in volts rms, and the relative levels of the second through seventh harmonics. An example of a DECrease printout appears below.



Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

2.6.3 High Distortion Printouts

A High Distortion printout indicates that the THD has exceeded the programmed THD high limit. The printout includes the Mainframe's slot number (1-5), the channel phase letter (A, B, or C), the message "HI," and the time of occurrence (within 0.01 seconds). An example of a High Distortion printout appears below.

```
3A HI  10:07:22.23
```

2.6.4 Normal Distortion Printouts

A Normal Distortion printout indicates that the THD was greater than the THD high limit but has returned to within limits. The printout includes the Mainframe's slot number (1-5), the channel phase letter (A, B, or C), the message "NOR," the time it returned to within limits, the maximum THD value reached while out-of-limits, the fundamental amplitude when the maximum THD was recorded, and the relative levels of the second through seventh harmonics when the maximum THD was recorded. An example of a Normal Distortion printout appears below.

626

```
3A NOR 10:07:34.44
   HI  005.2 SEC
   MAX THD 002.3 %
   HARM 7  000.6 %
   HARM 6  000.1 %
   HARM 5  001.0 %
   HARM 4  000.1 %
   HARM 3  002.0 %
   HARM 2  000.1
   FUND 109.3 V
```

626A

```
   FUND 109.3 V
   HARM 2  000.1 %
   HARM 3  002.0 %
   HARM 4  000.1 %
   HARM 5  001.0 %
   HARM 6  000.1 %
   HARM 7  000.6 %
   MAX THD 002.3 %
   HI  005.2 SEC
3A NOR 10:07:34.44
```

2.6.5 Miscellaneous Printouts

The plug-in will report certain conditions under which it is unable to perform its normal operations. Table 2-3 lists these conditions and the resulting messages which occur.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

Table 2-3. Miscellaneous Printout Messages

Message	Meaning
SYNC LOST	The plug-in is unable to lock onto the signal used for synchronization (Phase A voltage). No measurements can be made until synchronization is achieved.
SYNC RESTORED	The plug-in has locked onto the synchronization signal.
FUND TOO LOW	The amplitude of the fundamental frequency component of the signal applied to the indicated channel is too low (less than 50 V rms). No measurements will be made for the indicated channel until a signal of sufficient amplitude is detected.
FUND RESTORED	The amplitude of the fundamental frequency component of the signal applied to the indicated channel is now sufficient (at least 50 V rms) for normal operation.
INPUT OVERLOAD	The peak value of the signal applied to the indicated channel has exceeded the full-scale range. No measurements will be made for the indicated channel until the input level is reduced to acceptable limits.
OVER RANGE	The rms value of the signal applied to the indicated channel is too high; the plug-in cannot tolerate a crest factor as high as specified. Measurements will continue unless an INPUT OVERLOAD is detected.
INPUT RESTORED	The input level of the signal applied to the indicated channel is now within acceptable limits. Monitoring will proceed normally.

2.6.6 Data Summary Printouts

While in the Operate Mode, pressing [DATA] will cause the plug-in to generate a Data Summary printout. For each channel, the printout will include the number of times THD exceeded the THD high limit, the highest THD reached during the most severe out-of-limits condition, and present values for THD, fundamental amplitude, and individual harmonic levels.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

The message "FUND TOO LOW" indicates that the signal level applied to the indicated channel is insufficient to produce meaningful values.

The message "INPUT OVERLOAD" means that the signal level applied to the indicated input exceeds the maximum full scale range. Note: Present values shown for this condition are for reference only and are not necessarily accurate.

The message "SYNC LOST" means that the plug-in is not locked onto a signal at this time and therefore cannot provide measurement values.

The following example Data Summary printout is from a 6024A plug-in with 109.3 V rms applied to Phase A and no connection to Phases B or C.

626

```
FUND TOO LOW

PHASE C

FUND TOO LOW

PHASE B

HARM 7   000.6 %
HARM 6   000.1 %
HARM 5   001.0 %
HARM 4   000.1 %
HARM 3   002.0 %
HARM 2   000.1 %
FUND     109.3 V
THD      002.3 %

PHASE A

PRESENT VALUES

PHC MAX THD 000.0%
PHC HI HITS  0000
PHB MAX THD 000.0%
PHB HI HITS  0000
PHA MAX THD 006.3%
PHA HI HITS  0002

626-PA-6024A
CH 3
```

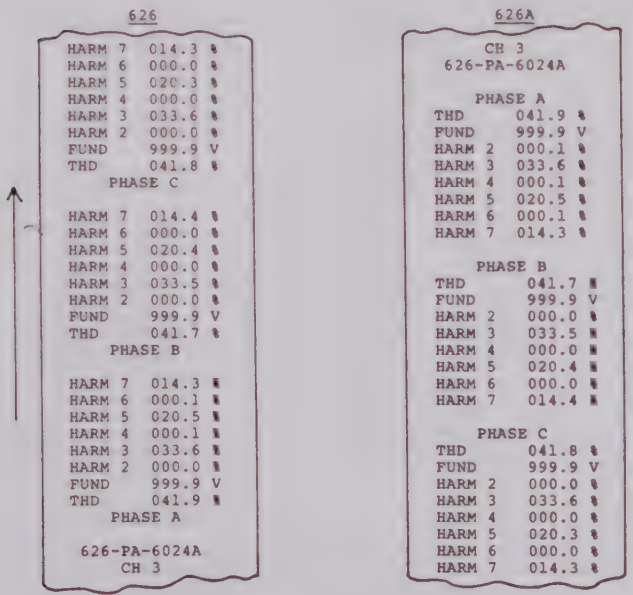
626A

```
CH 3
626-PA-6024A

PHA HI HITS  0002
PHA MAX THD 006.3%
PHB HI HITS  0000
PHB MAX THD 000.0%
PHC HI HITS  0000
PHC MAX THD 000.0%

PRESENT VALUES

PHASE A

THD      002.3 %
FUND     109.3 V
HARM 2   000.1 %
HARM 3   002.0 %
HARM 4   000.1 %
HARM 5   001.0 %
HARM 6   000.1 %
HARM 7   000.6 %

PHASE B

FUND TOO LOW

PHASE C

FUND TOO LOW
```

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

3.2.2 Example System Check Printout

The following example shows a typical System Check printout produced by a 6024A plug-in.



The above printout verifies the operational integrity of the 6024A plug-in for all three measurement phases (A, B, and C). The plug-in passes the System Check because all three values are within the tolerances of Subsection 3.2.1.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

WARNING

Because of possible shock or fire hazards, connection of this instrument should be performed in compliance with the National Electric Code (ANSI C1) or any other requirements, or both, which may be applicable to the user.

Installation, operation, and maintenance should only be performed by qualified personnel.

TM-111960-G2

VOLUME 1 -- OPERATOR'S MANUAL

626-PA-6024B

THREE-PHASE AC CURRENT HARMONIC ANALYZER

15 June 1986
(Rev. 1 October 1986)

See opposite side relative to proprietary rights.

Note: Refer to Volume 2 (Service Manual) of TM-111960-G2 for maintenance information.

© Copyright 1986
Dranetz Technologies, Inc.
All Rights Reserved.

DRANETZ

DRANETZ TECHNOLOGIES, INC.
1000 New Durham Rd., PO Box 4019
Edison, New Jersey 08818-4019

NOTICE REGARDING DRANETZ' PROPRIETARY RIGHTS

This publication contains information proprietary to Dranetz Technologies, Inc. By accepting and using this manual, the user agrees that the information contained herein will be used solely for the purpose of repairing or operating equipment of Dranetz Technologies, Inc. These manuals are to be returned to Dranetz Technologies, Inc. when no longer required by the user, or when there is a change in ownership of the equipment.

These publications are protected under the Copyright laws of the United States Title 17 et seq. No part of this publication may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language or computer language, in any form, by any means, electronic, mechanical, magnetic, optical, chemical, manual, or otherwise, without the prior written permission of Dranetz Technologies, Inc., 1000 New Durham Road, PO Box 4019, Edison, New Jersey 08818-4019.

Table of Contents (Page 1 of 3)

Section		Page
I	**GENERAL INFORMATION**	1-1
	Subsection	
	1.1 SCOPE	1-1
	1.2 INTRODUCTION	1-1
	1.3 PURPOSE	1-1
	1.4 APPLICATIONS	1-2
	1.5 EQUIPMENT CHARACTERISTICS	1-2
	1.5.1 Absolute Maximum Ratings: Cautions	1-2
	1.6 MEASUREMENT CAPABILITIES	1-4
	1.6.1 General	1-4
	1.6.2 Definition of Total Harmonic Distortion	1-4
	1.6.3 General Operational Description	1-4
	1.6.3.1 Sampling	1-4
	1.6.3.2 Computation	1-5
	1.6.3.3 Analysis	1-5
	1.6.3.4 Sync Lost Condition	1-5
	1.7 STANDARD ACCESSORIES	1-5
	1.8 OPTIONAL ACCESSORIES	1-6
	1.9 FACTORY REPAIR	1-6
II	**INSTALLATION AND OPERATION**	2-1
	Subsection	
	2.1 GENERAL	2-1
	2.2 LOAD RATINGS	2-1
	2.3 INSTALLING THE PLUG-IN INTO THE MAINFRAME	2-2
	2.4 CONNECTING POWER SOURCE TO THE MODULE	2-2
	2.4.1 Input Connection Instructions	2-2
	2.4.2 Circuit Applications	2-3

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

Table of Contents (Page 2 of 3)

Section		Page
II (Cont'd)		
	Subsection	
	2.5 OPERATING THE 6024B PLUG-IN	2-5
	2.5.1 Operating Controls and Indicators	2-5
	2.5.2 Programmable Limits and Thresholds	2-7
	2.5.3 Programming Procedure	2-7
	2.5.3.1 Programming all Channels Simultaneously	2-7
	2.5.3.2 Programming a Single Channel	2-8
	2.5.4 Selecting Factory Preset Values for the Plug-in	2-9
	2.6 DESCRIPTION OF DATA PRINTOUTS	2-10
	2.6.1 INCrease Printouts	2-10
	2.6.2 DECrease Printouts	2-10
	2.6.3 High Distortion Printouts	2-11
	2.6.4 Normal Distortion Printouts	2-11
	2.6.5 Miscellaneous Printouts	2-11
	2.6.6 Data Summary Printouts	2-12
	2.6.7 Daily Summary Printouts	2-14
	2.7 VARIOUS PRINTOUT MODES	2-14
III	**OPERATIONAL TEST**	3-1
	Subsection	
	3.1 GENERAL	3-1
	3.2 SYSTEM CHECK	3-1
	3.2.1 System Check Tolerances	3-1
	3.2.2 Example System Check Printout	3-2

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

Table of Contents (Page 3 of 3)

List of Tables

Table		Page
1-1	6024B Plug-in Technical Specifications	1-3
2-1	Load Ratings	2-1
2-2	6024B Plug-in Operating Controls	2-5
2-3	Miscellaneous Printout Messages	2-12
3-1	System Check Tolerance Ranges	3-1

List of Illustrations

Figure		Page
2-1	Line-to-Neutral (Four-Wire) Input Connections	2-4
2-2	Line-to-Line (Three-Wire) Input Connections	2-4
2-3	Separate Sources Input Connections	2-4
2-4	Series 626 Controls used by the 6024B Plug-in	2-6

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

STATEMENT OF WARRANTY

ALL PRODUCTS OF DRANETZ TECHNOLOGIES, INC. ARE WARRANTED TO THE ORIGINAL PURCHASER AGAINST DEFECTIVE MATERIAL AND WORKMANSHIP FOR A PERIOD OF ONE YEAR FROM THE DATE OF DELIVERY. DRANETZ WILL REPAIR OR REPLACE, AT ITS OPTION, ALL DEFECTIVE EQUIPMENT RETURNED, FREIGHT PREPAID, DURING THE WARRANTY PERIOD, WITHOUT CHARGE FOR REPAIR, PROVIDED THERE IS NO EVIDENCE THAT THE EQUIPMENT HAS BEEN MISHANDLED OR ABUSED. THIS WARRANTY SHALL NOT APPLY TO ANY DEFECTS RESULTING FROM IMPROPER OR INADEQUATE MAINTENANCE, BUYER-SUPPLIED HARDWARE/SOFTWARE OR INTERFACING, UNAUTHORIZED MODIFICATION OR MISUSE OF THE EQUIPMENT, OPERATION OUTSIDE OF THE ENVIRONMENTAL SPECIFICATIONS FOR THE PRODUCT, OR IMPROPER SITE PREPARATION OR MAINTENANCE.

The information in this manual has been reviewed and is believed to be entirely reliable. No responsibility, however, is assumed for any inaccuracies. The material in this manual is for information purposes only, and is subject to change without notice.

VOLUME 1
OPERATOR'S MANUAL

626-PA-6024B THREE-PHASE AC CURRENT HARMONIC ANALYZER

SECTION I
GENERAL INFORMATION

1.1 SCOPE

The manual for this product consists of two volumes. Volume 1, the Operator's manual, is divided into three sections: (I) GENERAL INFORMATION, (II) INSTALLATION AND OPERATION, and (III) OPERATIONAL TEST. Volume 2, the Service manual, contains the maintenance instructions and consists of four sections, IV through VII. (See Volume 2 for a description of these sections.)

1.2 INTRODUCTION

Volume 1 of this manual provides Operator's instructions for the 626-PA-6024B Three-Phase AC Current Harmonic Analyzer plug-in module, also referred to as the 6024B plug-in. The 6024B plug-in is intended for use in a Series 626 Mainframe. Before reading these instructions further, you should be familiar with the information described in the Mainframe manual.

1.3 PURPOSE

The 6024B monitors harmonic distortion of current waveforms on three-phase ac power lines. Clamp-on current probes are used for each of three channels to measure current up to 300 A rms, with a maximum crest factor of 5, over a frequency range of 47 to 63 Hz. The plug-in reports disturbances when the total harmonic distortion (THD) of any channel exceeds a programmable threshold. It also reports a disturbance when the THD changes as much as the programmed sensitivity.

Disturbance printouts include the percentage of THD, root-mean-square (rms) current at the fundamental frequency, and values for each harmonic up to and including the seventh expressed as a percentage of the fundamental. A separate voltage input is provided for use as a frequency reference. THD thresholds and sensitivities are separately programmable for each channel.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

1.4 APPLICATIONS

When installed in the Mainframe, the 6024B plug-in monitors changes in the total harmonic distortion present in the current waveform on ac power lines. Among the typical applications are:

-- Verifying that the harmonic content in the ac power supplied to sensitive equipment (such as computers) is within manufacturer's specifications.

-- Determining if electrical components (such as transformers and inductors) are being stressed due to power dissipation at harmonic frequencies.

-- Identifying excessive harmonic currents caused by non-linear loads (such as switching power supplies).

1.5 EQUIPMENT CHARACTERISTICS

The 6024B is configured as a plug-in module 6.5" high by 1.25" wide by 10.25" deep. It may be installed in any one of five slots of the Series 626 Mainframe. Technical specifications of the 6024B are presented in Table 1-1.

1.5.1 Absolute Maximum Ratings: Cautions

Be aware of the following cautions when applying input voltage and installing TR-2019 current probes.

CAUTIONS

DO NOT exceed ac voltage of 600 V rms, referenced to safety ground, to input terminals marked "+" or "-" on the SYNC VOLTAGE connector.

DO NOT install TR-2019 current probes on conductors carrying more than 300 A rms.

DO NOT install TR-2019 current probes on conductors to which more than 600 V rms, referenced to safety ground, is applied.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

Table 1-1. 6024B Plug-in Technical Specifications

Current Measurement Inputs:	(3) TR-2019 current probe connectors are included (P/N 111666)
Sync Voltage Input:	3-position pin and socket connector with (2) high-impedance inputs plus safety ground. Impedance is 40 Megohms, each side to ground. A cable assembly is included (P/N 110597)
Sync Voltage Input Range:	50 to 600 V rms
Current Measurement Range:	3 to 300 A rms
Maximum Crest Factor:	5
Input Frequency Range:	47 to 63 Hz fundamental
THD High Limit: (user-progammable)	1% to 255% THD
THD Sensitivity: (user-programmable)	1% to 255% THD
THD Measurement Resolution:	0.1% THD
THD Measurement Accuracy:	±5% of reading, ±1% (See Note)
Fundamental Measurement Resolution:	0.1A rms
Fundamental Measurement Accuracy:	±1% of reading, ±0.2% F.S.
Harmonic Measurement Resolution:	0.1% of fundamental voltage
Harmonic Measurement Accuracy:	±5% of reading, ± 1% (See Note)
Current Probe Calibration Accuracy:	±1% (See Note)

NOTE

Measurement accuracy specifications do not include the accuracy of the current probes. The total error for a particular measurement is the sum of the specified measurement accuracy and the current probe calibration accuracy. Contact Dranetz Technologies, Inc., Sales Dept. (201-287-3680) if higher accuracy is required.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

1.6 MEASUREMENT CAPABILITIES

1.6.1 General

The 6024B plug-in operates by measuring the total harmonic distortion (THD) of the signals applied to its inputs, and generating printouts based on changes in the measured THD. Along with THD values, the plug-in also provides values for the amplitude of the fundamental plus the relative levels of the second through the seventh harmonics. The amplitude of the fundamental is expressed as root-mean-square (rms) current. The relative levels of the second through seventh harmonics are expressed as percentages of the fundamental.

1.6.2 Definition of Total Harmonic Distortion

Values for THD are calculated according to the following definition:

$$THD = 100 * \left(\frac{[\text{sum of squares of rms amplitudes of 2nd through 7th harmonics}]^{\frac{1}{2}}}{[\text{rms amplitude of the fundamental}]} \right)$$

In words, the total harmonic distortion as measured by the 6024B plug-in is defined as the value equal to 100 times the ratio of the square root of the sum of the squares of the root-mean-square amplitudes of the individual harmonics up to and including the seventh, to the root-mean-square amplitude of the fundamental. This is NOT the same as the sum of the relative levels of the harmonics.

1.6.3 General Operational Description

While in the Operate Mode, the 6024B plug-in performs approximately seven measurements per second. Each measurement consists of three parts: sampling, computation, and analysis. At the end of each measurement, any disturbances detected will be processed for printing, summary information will be updated, and new present values will be made available.

1.6.3.1 Sampling

The currents applied to the module's inputs are sampled 32 times per ac cycle over four consecutive ac cycles. The samples for all four ac cycles are then averaged, resulting in 32 samples per channel upon which all calculations are based. The sampling period is synchronized to the SYNC VOLTAGE input.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

1.6.3.2 Computation

The rms amplitudes for all frequency components from the fundamental to the seventh harmonic are calculated using a discrete fourier transform (DFT). These rms values are then used to calculate the THD and the levels of the individual harmonics relative to the fundamental.

1.6.3.3 Analysis

The new THD value is compared with the THD from the previous measurement to determine the amount of change. If the change was equal to or greater than the programmed THD sensitivity, an INCrease or DECrease is reported. The THD value is also compared with the programmed THD high limit to determine if an out-of-limits condition exists. If the new THD value is higher than the THD high limit, and the THD from the previous measurement cycle was not, a "high" disturbance is reported. In subsequent measurements, as long as the THD remains above the THD high limit, the plug-in will keep track of the highest THD value achieved and the duration of the out-of-limits condition (up to 652.8 seconds).

When the THD returns to a level within limits, the plug-in will report that the distortion has returned to normal, the highest THD value achieved while out-of-limits, and the duration of the out-of-limits condition (within 0.1 seconds).

1.6.3.4 Sync Lost Condition

The plug-in can detect changes in the fundamental frequency of the signal used for synchronization. If frequency changes are detected during sampling, the plug-in will report a "SYNC LOST" condition, and no further measurements will be taken until four consecutive cycles occur with no change in frequency. When a steady-state condition is established, the plug-in will report "SYNC RESTORED" and continue its normal monitoring operation.

1.7 STANDARD ACCESSORIES

Part #	Quantity	Description
TM-111960-G2 Vol. 1	1	Operator's Manual
111666	3	TR-2019 Current Probes
110597	1	AC Cable Assembly w/Plug

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

1.8 OPTIONAL ACCESSORIES

Part #	Quantity	Description
TM-111960-G2 Vol. 2	1	Service (Maintenance) Manual

1.9 FACTORY REPAIR

When factory repair is required, proceed as follows:

1. Contact Dranetz Service Corporation (formerly Dranetz Technologies, Inc., Customer Service Dept.) in order to obtain an authorization number for factory repair.

   Telephone No: (201) 755-7081 Telex: 499-7808

   TWX: (710) 997-9553 Cable: DRANETZ

2. Fill out the REPAIR/SERVICE ORDER form enclosed in the Series 626 Operating manual. Ship it along with the equipment to Dranetz Service Corporation. (If this form is missing, contact Dranetz Service Corp. for a replacement form.)

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

SECTION II
INSTALLATION AND OPERATION

2.1 GENERAL

This section contains the installation, programming, and operating instructions for the 6024B plug-in.

2.2 LOAD RATINGS

The Series 626 standard Mainframe has an upper limit of the combined total rating of its installed modules. The overall Mainframe capacity is set at 20 units. The individual modules (existing as of this printing) have the following load ratings:

Table 2-1. Load Ratings

Plug-in	Load Rating
626-PA-6001	2 Units
626-PA-6001 with extra option bd.	3 Units
626-PA-6002	2 Units
626-PA-6003	4 Units
626-PA-6005	2 Units
626-PA-6006	2 Units
626-PA-6007	1 Unit
626-PA-6008	2 Units
626-PA-6009	4 Units
626-PA-6011	1 Unit
626-PA-6012	2 Units
626-PA-6012A	3 Units
626-PA-6013	2 Units
626-PA-6014	1 Unit
626-PA-6015	4 Units
626-PA-6018	4 Units
626-PA-6020	4 Units
626-PA-6024B	4 Units
626-PA-6024B	4 Units
626-PA-6030	6 Units

NOTE

When selecting modules for installation into any Series 626 Mainframe, verify that the sum of the load ratings of the installed modules DOES NOT exceed 20 units.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

2.3 INSTALLING THE PLUG-IN MODULE INTO THE MAINFRAME

To install the 6024B plug-in into the Mainframe:

WARNING

Be sure that the Series 626 Mainframe and all of the power connected to its plug-in modules are first turned OFF before proceeding with any installation.

(1) Remove the 6024B plug-in from its packaging.

(2) With the rear panel markings of the module reading correctly, carefully slide the module into the upper and lower card-guide tracks of the desired slot until it is firmly seated.

(3) Tighten the top and bottom captive screws to secure the module into the Mainframe.

2.4 CONNECTING POWER SOURCE TO THE MODULE

CAUTION

To avoid damaging the equipment, DO NOT exceed the absolute maximum ratings given in the CAUTIONS of Subsection 1.5.1.

WARNING

Because of possible shock or fire hazards, connection of this instrument should be performed in compliance with the National Electric Code (ANSI C1), or any other requirements, or both, which may be applicable to the user.

Installation, operation, and maintenance should only be performed by qualified personnel. Your qualifications for doing so should be self-determined.

2.4.1 Input Connection Instructions

The 6024B plug-in is equipped with three connectors labeled "PHASE A," "PHASE B," and "PHASE C." The connectors accept three TR-2019 current probes (P/N 111666), plus a separate 3-position pin and socket connector (labeled "SYNC VOLTAGE") for ac voltage.

All measurements are synchronized to the voltage applied to the SYNC VOLTAGE connector. This voltage must therefore be derived from the ac source providing current to the monitored conductors.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

The three positions of the SYNC VOLTAGE connector are labeled "+," "-," and "⏚." The "+" and "-" positions are high impedance voltage inputs; the "⏚" position is internally connected to safety ground. The proper connection procedure follows.

(1) Turn the Mainframe off by inserting the key into the FUNCTION key switch on the front panel and setting the switch to "OFF." Unplug the Mainframe from the power source.

(2) Turn off the power source(s) to be monitored by the module.

(3) Turn off the source providing the synchronization voltage.

(4) Connect the cable assembly (P/N 110597) to the SYNC VOLTAGE connector; connect the plug on the end of the cable assembly to the source providing the synchronization voltage.

(5) Attach the current probe connectors to the mating connectors on the rear panel; install the current probes on the desired lines.

(6) Plug the Mainframe back into the power source. Turn on the Mainframe by turning the FUNCTION key switch to "OPERATE."

(7) Turn on the source providing the synchronization voltage.

(8) Turn on the power source(s) to be monitored.

2.4.2 Circuit Applications

WARNING

Conductors connecting to measurement points should be approved for the specific use. When connected to branch circuits of 20 amperes or less, the minimum flexible cord size is No. 18 AWG (1 mm square). For branch circuits with higher ampacity, refer to National Electric Code (ANSI C1-1975), paragraphs 240-4 and 250-95. Special consideration of ground may be required. (Refer to Article 250 of above reference if in doubt.) Outside of the United States, consult the applicable safety standards.

The 6024B may be used to monitor harmonic distortion on three-phase four-wire (Wye), three-phase three-wire (Delta), or three separate power lines. Figures 2-1, 2-2, and 2-3 illustrate proper connections for all recommended applications.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

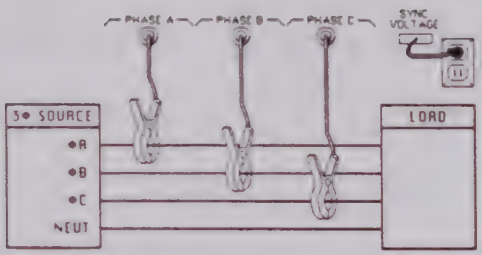


Figure 2-1. Line-to-Neutral (Four-Wire) Input Connections

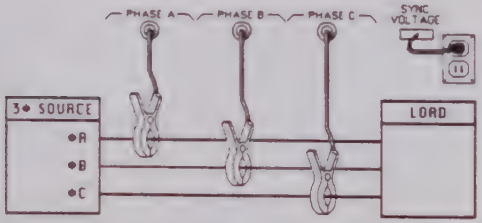


Figure 2-2. Line-to-Line (Three-Wire) Input Connections

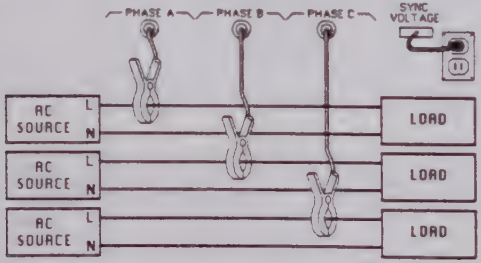


Figure 2-3. Separate Sources Input Connections

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

2.5 OPERATING THE 6024B PLUG-IN

2.5.1 Operating Controls and Indicators

The functions of the Mainframe operating controls and indicators associated with the 6024B plug-in are described in Table 2-2. Figure 2-4 shows a typical front panel of a Mainframe and its controls associated with the 6024B plug-in. For a description of controls common to overall Series 626 operation, refer to Volume 1 of your Mainframe manual.

Table 2-2. 6024B Plug-in Operating Controls

ITEM	FUNCTION
Numerical Keys*	Used to enter numerical values for the various functions.
[HI LIMIT] Key	When pressed in Program Mode while the red LED above the red keys is lit, this key enables the unit to accept a new value for the THD high limit.
[SENS] Key	When pressed in the Program Mode while the red LED above the red keys is lit, this key enables the unit to accept a new value for THD high limit.
[INPUT] Key	When pressed in Program Mode, this key initiates the programming for a single channel.
[ENTER] Key	When pressed, transfers the entered numerical value into the plug-in's non-volatile memory and checks for errors.
[CLEAR ENTRY] Key	When pressed in the Program Mode while entering a new value, cancels the current entry.
[PROG] Button*	When pressed in the Operate Mode, produces a Program Summary printout. Also active in the Program Mode while the INPUT LED is lit.
[DATA] Button	When pressed in the Operate Mode, produces a Data Summary printout along with the present values measured from the inputs.
[PRESET] Button	When pressed in the Program Mode, programs all three channels with their factory preset values.

* -"Key" and "Keyboard" represent the red, green, and yellow keys; "Button" represents the black selector buttons.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

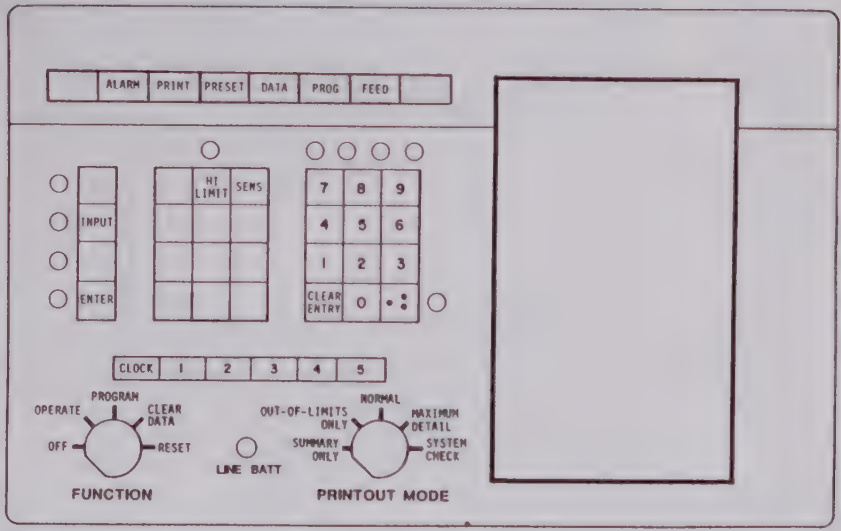


Figure 2-4. Series 626 Controls used by the 6024B Plug-in

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

2.5.2 Programmable Limits and Thresholds

The 6024B plug-in generates disturbance printouts based on comparison of the measured THD with two user-programmable parameters: THD high limit and THD sensitivity. The module will report an out-of-limits condition when the measured THD exceeds the programmed THD high limit; it will report an INCrease or DECrease when the THD changes as much as or more than the THD sensitivity.

The THD high limit should be set to the maximum percentage value of the total harmonic distortion considered acceptable for the power line being monitored. The THD sensitivity should be set so that the module will report significant changes in THD without generating extraneous data.

2.5.3 Programming Procedure

Typically, new values for THD high limit and sensitivity are set for all three channels at once; however, individual channels may also be programmed separately.

2.5.3.1 Programming all Channels Simultaneously

The clearest way of explaining the simultaneous programming is through an example. Assume that for all three channels:

a. THD greater than 5% is out-of-limits,

b. Changes in THD of 2% or more should be recognized.

To program the 6024B plug-in with these values:

(1) Set the FUNCTION key switch to "PROGRAM."

(2) Press the channel button (1-5) corresponding to the slot position of the 6024B plug-in. Note that a Program Summary for that channel is immediately printed.

(3) The red LED above the red key group lights, indicating that one of the parameters from this group may be selected. For the 6024B plug-in, only the [HI LIMIT] and [SENS] keys are active. For the purposes of this example, set the high limit first by pressing [HI LIMIT].

(4) Three yellow LEDs above the yellow key group light, indicating that a 3-digit value is expected, representing the THD high limit percentage. For this example (5%), press [0], [0], [5].*

(5) The green LED next to the [ENTER] key will light. Press [ENTER]. The message "THD HILIM 005%" will be printed to confirm the newly programmed value.

---

* If an incorrect entry is made, press [CLEAR ENTRY] and begin over.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

(6) The red LED above the red key group lights, indicating that another parameter may now be selected. Press [SENS].

(7) Three yellow LEDs above the yellow key group light, indicating that a 3-digit value is expected, representing the THD sensitivity percentage. For this example (2%), press [0], [0], [2].

(8) The green LED next to the [ENTER] key will light. Press [ENTER]. The message "THD SENS 002%" will be printed to confirm the newly programmed value.

2.5.3.2 Programming a Single Channel

As with the previous subsection, the clearest way of explaining single channel programming is through an example. Assume that for Phase C only the following is desired:

a. THD greater than 7% is out-of-limits,

b. Changes in THD of 3% or more should be recognized.

To program the 6024B plug-in with these values for Phase C:

(1) Set the FUNCTION key switch to "PROGRAM."

(2) Press the channel button (1-5) corresponding to the slot position of the 6024B plug-in. Note that a Program Summary for that channel is immediately printed.

(3) The red LED above the red key group lights, indicating that one of the parameters from this group may be selected. DO NOT press one of the indicated keys (keys with lit LEDs next to them); instead, press [INPUT].

(4) One yellow LED above the yellow key group lights, indicating that a 1-digit choice is expected. Pressing [1], [2], or [3] will select Phase A, Phase B, or Phase C, respectively. For this example (Phase C), press [3].

(5) The red LED above the red key group lights, indicating that one of the parameters from this group may be selected. Press [HI LIMIT].

(6) Three yellow LEDs above the yellow key group light, indicating that a 3-digit value is expected, representing the THD high limit percentage. For this example, press [0], [0], [7].

(7) The green LED next to the [ENTER] key will light. Press [ENTER]. The message "PHC THD HILIM 007%" will be printed to confirm the newly programmed value.

(8) The red LED above the red key group should be lit. To program the THD sensitivity, first press [INPUT].

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

(9) Press [3] to select Phase C.

(10) Press [SENS].

(11) Press [0], [0], [3].

(12) Press [ENTER]. The message "PHC THD SENS 003%" will be printed to confirm the newly programmed value.

If an attempt is made to enter values outside the allowable ranges specified in Table 1-1, the message "ENTRY TOO HIGH" or "ENTRY TOO LOW" will be printed and new values must be entered.

When the plug-in's programming is completed, another plug-in may be selected for programming by pressing the appropriate channel. When all plug-ins in the unit have been programmed as desired, the Operate Mode may be selected by turning the FUNCTION key switch to "OPERATE.".

2.5.4 Selecting Factory Preset Values for the Plug-in

When the LED above the red key group is lit, the [PRESET] button may be pressed to cause all three channels to be programmed with factory preset values. A Program Summary, indicating the preset values, will then be printed. An example of such a printout follows:

626*

```
THD SENS      005 %
THD HI LIMIT  005 %

      PHASE C

THD SENS      005 %
THD HI LIMIT  005 %

      PHASE B

THD SENS      005 %
THD HI LIMIT  005 %

      PHASE A

   626-PA-6024B
```

626A*

```
   626-PA-6024B

      PHASE A

THD HI LIMIT  005 %
THD SENS      005 %

      PHASE B

THD HI LIMIT  005 %
THD SENS      005 %

      PHASE C

THD HI LIMIT  005 %
THD SENS      005 %
```

* If you are using a Model 626 Mainframe, refer to the "626" printouts (read up) in this manual; if you are using a Model 626A, refer to the "626A" printouts (read down) instead.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

2.6 DESCRIPTION OF DATA PRINTOUTS

While in the "Operate" Mode, the 6024B plug-in may produce four types of disturbance related printouts:

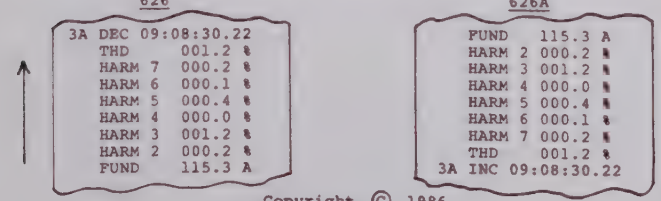
-- INCreases,
-- DECreases,
-- High distortion, and
-- Normal distortion.

2.6.1 INCrease Printouts

An INCrease printout indicates that the THD has increased by an amount equal to or greater than the programmed THD sensitivity. The printout includes the Mainframe's slot number (1-5), the channel phase letter (A, B, or C), the message "INC," the time of the occurrence (within 0.01 seconds), the new THD value, the fundamental amplitude in amperes rms, and the relative levels of the second through seventh harmonics. An example of an INCrease printout appears below.

2.6.2 DECrease Printouts

A DECrease printout indicates that the THD has decreased by an amount equal to or greater than the programmed THD sensitivity. The printout includes the Mainframe slot number (1-5), the channel phase letter (A, B, or C), the message "DEC," the time of occurrence (within 0.1 seconds), the new THD value, the fundamental amplitude in amperes rms, and the relative levels of the second through seventh harmonics. An example of a DECrease printout appears below.



Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

2.6.3 High Distortion Printouts

A High Distortion printout indicates that the THD has exceeded the programmed THD high limit. The printout includes the Mainframe's slot number (1-5), the channel phase letter (A, B, or C), the message "HI," and the time of occurrence (within 0.01 seconds). An example of a High Distortion printout appears below.

```
3A HI  10:07:22.23
```

2.6.4 Normal Distortion Printouts

A Normal Distortion printout indicates that the THD was greater than the THD high limit but has returned to within limits. The printout includes the Mainframe's slot number (1-5), the channel phase letter (A, B, or C), the message "NOR," the time it returned to within limits, the maximum THD value reached while out-of-limits, the fundamental amplitude when the maximum THD was recorded, and the relative levels of the second through seventh harmonics when the maximum THD was recorded. An example of a Normal Distortion printout appears below.

626

```
3A NOR 10:07:34.44
   HI  005.2 SEC
   MAX THD 002.3 %
   HARM 7  000.6 %
   HARM 6  000.1 %
   HARM 5  001.0 %
   HARM 4  000.1 %
   HARM 3  002.0 %
   HARM 2  000.1
   FUND 109.3 A
```

626A

```
   FUND 109.3 A
   HARM 2  000.1 %
   HARM 3  002.0 %
   HARM 4  000.1 %
   HARM 5  001.0 %
   HARM 6  000.1 %
   HARM 7  000.6 %
   MAX THD 002.3 %
   HI  005.2 SEC
3A NOR 10:07:34.44
```

2.6.5 Miscellaneous Printouts

The plug-in will report certain conditions under which it is unable to perform its normal operations. Table 2-3 lists these conditions and the resulting messages which occur.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

Table 2-3. Miscellaneous Printout Messages

Message	Meaning
SYNC LOST	The plug-in is unable to lock onto the signal applied to the SYNC VOLTAGE input. No measurements can be made until synchronization is achieved.
SYNC RESTORED	The plug-in has locked onto the synchronization signal.
FUND TOO LOW	The amplitude of the fundamental frequency component of the signal applied to the indicated channel is too low (less than 3 A rms). No measurements will be made for the indicated channel until a signal of sufficient amplitude is detected.
FUND RESTORED	The amplitude of the fundamental frequency component of the signal applied to the indicated channel is now sufficient (at least 3 A rms) for normal operation.
INPUT OVERLOAD	The peak value of the signal applied to the indicated channel has exceeded the full-scale range. No measurements will be made for the indicated channel until the input level is reduced to acceptable limits.
OVER RANGE	The rms value of the signal applied to the indicated channel is too high; the plug-in cannot tolerate a crest factor as high as specified. Measurements will continue unless an INPUT OVERLOAD is detected.
INPUT RESTORED	The input level of the signal applied to the indicated channel is now within acceptable limits. Monitoring will proceed normally.

2.6.6 Data Summary Printouts

While in the Operate Mode, pressing [DATA] will cause the plug-in to generate a Data Summary printout. For each channel, the printout will include the number of times THD exceeded the THD high limit, the highest THD reached during the most severe out-of-limits condition, and present values for THD, fundamental amplitude, and individual harmonic levels.

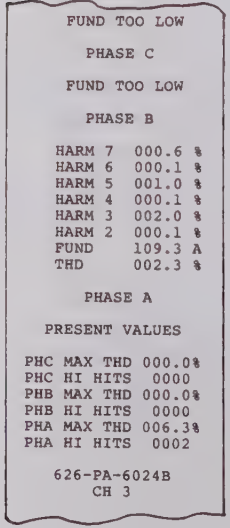
Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

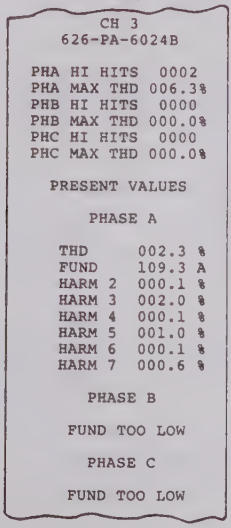
The message "FUND TOO LOW" indicates that the signal level applied to the indicated channel is insufficient to produce meaningful values.

The message "INPUT OVERLOAD" means that the signal level applied to the indicated input exceeds the maximum full scale range. Note: Present values shown for this condition are for reference only and are not necessarily accurate.

The message "SYNC LOST" means that the plug-in is not locked onto a signal at this time and therefore cannot provide measurement values.

The following example Data Summary printout is from a 6024B plug-in with 109.3 A rms applied to Phase A and no connection to Phases B or C.





Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

2.6.7 Daily Summary Printouts

Every day at midnight (Series 626 time), a Daily Summary printout for all plug-ins is automatically generated. For the 6024B plug-in, the Daily Summary printout is exactly like the Data summary printout. After the Daily Summary printout is completed, the Mainframe's Summary-Data memory is cleared.

2.7 VARIOUS PRINTOUT MODES

The setting of the PRINTOUT MODE key switch on the front panel of the Series 626 Mainframe determines the amount of detail which is printed from any disturbance. The further clockwise the key is turned, up to the SYSTEM CHECK position, the more detail that is printed regarding a disturbance. Below is a list of the four key switch positions and the amount of detail printed when the PRINTOUT MODE key is in each position.

SUMMARY ONLY

The Series 626 printer is inhibited. All data acquired by the 6024B plug-in is stored in the Mainframes's daily accumulator. A daily summary of the worst-case disturbance events is printed at midnight (Series 626 time), or whenever the black [DATA] button is pressed.

OUT-OF-LIMITS-ONLY

Disturbance data is ONLY printed when the disturbance is recorded as out-of-limits (INCrease and DECrease disturbances are never printed).

NORMAL

Out-of-limits disturbances are always printed; INCrease and DECrease disturbances are printed when the measurement is out-of-limits, but not when the measured value is within limits.

MAXIMUM DETAIL

A highly detailed printout of every disturbance recorded by the 6024B plug-in is printed.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

SECTION III
OPERATIONAL TEST

3.1 GENERAL

This section provides information for performing an operational test to verify that the 6024B plug-in is operating properly.

3.2 SYSTEM CHECK

(1) Set the FUNCTION key switch to "OPERATE."

(2) Turn the PRINTOUT MODE key momentarily to "SYSTEM CHECK," and then back to "NORMAL."

During this test, the circuitry is switched so that an on-board test signal is measured instead of the signal at the inputs. The test signal simulates a high amplitude square wave, which has only odd harmonics.

(3) Compare the actual displayed readings with those in Subsection 3.2.1 below. If any readings are out of the tolerance range, contact Dranetz Service Corp. for further instructions (refer to Subsection 1.9, FACTORY REPAIR).

3.2.1 System Check Tolerances

Acceptable values for System Check printouts are listed in Table 3-1 below.

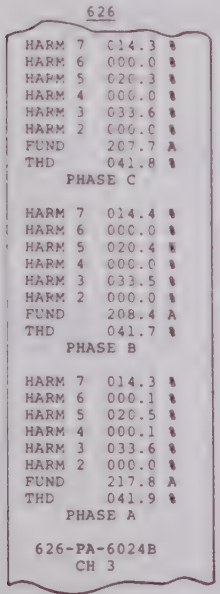
Table 3-1. System Check Tolerance Ranges

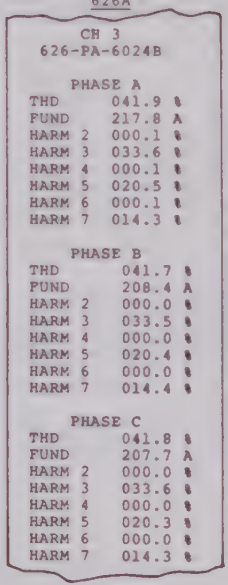
	Minimum	Maximum
THD	040.4 %	042.4 %
FUND	220.0 A	240.0 A
HARM 2	000.0 %	001.0 %
HARM 3	032.3 %	034.3 %
HARM 4	000.0 %	001.0 %
HARM 5	019.0 %	021.0 %
HARM 6	000.0 %	001.0 %
HARM 7	013.3 %	015.3 %

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

3.2.2 Example System Check Printout

The following example shows a typical System Check printout produced by a 6024B plug-in.





The above printout verifies the operational integrity of the 6024B plug-in for all three measurement phases (A, B, and C). The plug-in passes the System Check because all three values are within the tolerances of Subsection 3.2.1.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

WARNING

Because of possible shock or fire hazards, connection of this instrument should be performed in compliance with the National Electric Code (ANSI C1) or any other requirements, or both, which may be applicable to the user.

Installation, operation, and maintenance should only be performed by qualified personnel.

TM-112975

VOLUME 1 -- OPERATOR'S MANUAL

626-PA-6030

THREE-PHASE AC GRAPHICS MONITOR

1 May 1986

(Revised 1 Sept. 1986)

See opposite side relative to proprietary rights.

Note: Refer to Volume 2 (Service Manual) of TM-112975 for maintenance information.

© Copyright 1986
Dranetz Technologies, Inc.
All Rights Reserved.

DRANETZ

DRANETZ TECHNOLOGIES, INC.
1000 New Durham Rd., PO Box 4019
Edison, New Jersey 08818-4019

NOTICE REGARDING DRANETZ' PROPRIETARY RIGHTS

This publication contains information proprietary to Dranetz Technologies, Inc. By accepting and using this manual, the user agrees that the information contained herein will be used solely for the purpose of repairing or operating equipment of Dranetz Technologies, Inc. These manuals are to be returned to Dranetz Technologies, Inc. when no longer required by the user, or when there is a change in ownership of the equipment.

These publications are protected under the Copyright laws of the United States Title 17 et seq. No part of this publication may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language or computer language, in any form, by any means, electronic, mechanical, magnetic, optical, chemical, manual, or otherwise, without the prior written permission of Dranetz Technologies, Inc., 1000 New Durham Road, PO Box 4019, Edison, New Jersey 08818-4019.

Table of Contents (Page 1 of 3)

Section		Page
I	**GENERAL INFORMATION**	1-1
	Subsection	
	1.1 SCOPE	1-1
	1.2 INTRODUCTION	1-1
	1.3 PURPOSE	1-1
	1.3.1 Three-Phase Monitoring	1-2
	1.3.2 Threshold Alterations	1-2
	1.4 APPLICATIONS	1-3
	1.5 EQUIPMENT CHARACTERISTICS	1-3
	1.6 STANDARD ACCESSORIES	1-5
	1.6.1 Required Accessories	1-6
	1.7 OPTIONAL ACCESSORIES	1-6
	1.8 FACTORY REPAIR	1-6
II	**INSTALLATION AND OPERATION**	2-1
	Subsection	
	2.1 GENERAL	2-1
	2.2 LOAD RATINGS	2-1
	2.3 INSTALLATION	2-2
	2.4 CONNECTING POWER SOURCE TO MODULE	2-2
	2.4.1 Connection Procedure	2-3
	2.4.2 Circuit Applications	2-3
	2.5 MONITORING GUIDELINES	2-8
	2.6 OPERATING THE 6030 PLUG-IN	2-9
	2.6.1 Operating Controls and Indicators	2-9
	2.6.2 Programming Procedure	2-11
	2.6.3 Selecting the Factory Preset Program	2-13
	2.7 DESCRIPTION OF DATA PRINTOUTS	2-14
	2.7.1 Overvoltage	2-15
	2.7.2 Undervoltage	2-15

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

Table of Contents (Page 2 of 3)

Section — Page

II (Cont'd)

Subsection

2.7.3 Voltage Change 2-16
2.7.4 Voltage Surge 2-16
2.7.5 Voltage Sag 2-17
2.7.6 Impulses 2-17
2.7.7 Frequency Change 2-18

2.8 DESCRIPTION OF GRAPHIC PRINTOUTS 2-18

2.9 VARIOUS PRINTOUT MODES 2-19
2.9.1 Example Printouts using a Graphics Printer 2-19
2.9.1.1 Impulse Disturbance Printout 2-20
2.9.1.2 Surge Disturbance Printout 2-20
2.9.1.3 Overvoltage Disturbance Printout 2-22
2.9.1.4 Sag Disturbance Printout 2-22
2.9.1.5 Alternate Example of a Sag Disturbance Printout 2-23
2.9.1.6 Undervoltage Disturbance Printout 2-24
2.10 AUTOMATIC GRAPH SUPPRESSION 2-25

III **OPERATION TEST** 3-1

Subsection

3.1 GENERAL 3-1

3.2 SYSTEM CHECK 3-1
3.2.1 System Check Tolerances 3-1
3.2.2 Example System Check Printout 3-1

APPENDIX A

A.1 GENERAL A-1

A.2 TRANSMISSION OF GRAPHICS DATA A-1

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

Table of Contents (Page 3 of 3)

List of Illustrations

Figure		Page
2-1	One-Phase Normal Mode/Common Mode	2-4
2-2	Three Separate AC Lines	2-5
2-3	Three-Phase Delta	2-6
2-4	Three-Phase Wye	2-7
2-5	Series 626 Controls used by the 6030 Plug-in	2-10
2-6	Impulse Waveform Printed by the Model 626GP	2-20
2-7	Surge Waveform Printed by the Model 626GP	2-21
2-8	Sag Waveform Printed by the Model 626GP	2-23
2-9	Alternate Sag Waveform Example	2-24
2-10	Suppressed Graph Example	2-26
3-1	Sample System Check Printout	3-1

List of Tables

Table		Page
1-1	626-PA-6030 Technical Specifications	1-4
2-1	Load Ratings	2-1
2-3	6030 Plug-in Operating Controls	2-9
A-1	RS-232C Signals used by the Series 626	A-3

Epson FX-100+ was developed by Epson America, Inc.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

STATEMENT OF WARRANTY

ALL PRODUCTS OF DRANETZ TECHNOLOGIES, INC. ARE WARRANTED TO THE ORIGINAL PURCHASER AGAINST DEFECTIVE MATERIAL AND WORKMANSHIP FOR A PERIOD OF ONE YEAR FROM THE DATE OF DELIVERY. DRANETZ WILL REPAIR OR REPLACE, AT ITS OPTION, ALL DEFECTIVE EQUIPMENT RETURNED, FREIGHT PREPAID, DURING THE WARRANTY PERIOD, WITHOUT CHARGE FOR REPAIR, PROVIDED THERE IS NO EVIDENCE THAT THE EQUIPMENT HAS BEEN MISHANDLED OR ABUSED. THIS WARRANTY SHALL NOT APPLY TO ANY DEFECTS RESULTING FROM IMPROPER OR INADEQUATE MAINTENANCE, BUYER-SUPPLIED HARDWARE/SOFTWARE OR INTERFACING, UNAUTHORIZED MODIFICATION OR MISUSE OF THE EQUIPMENT, OPERATION OUTSIDE OF THE ENVIRONMENTAL SPECIFICATIONS FOR THE PRODUCT, OR IMPROPER SITE PREPARATION OR MAINTENANCE.

The information in this manual has been reviewed and is believed to be entirely reliable. No responsibility, however, is assumed for any inaccuracies. The material in this manual is for information purposes only, and is subject to change without notice.

VOLUME 1
OPERATOR'S MANUAL

MODEL 626-PA-6030 THREE-PHASE AC GRAPHICS MONITOR

SECTION I
GENERAL INFORMATION

1.1 SCOPE

The manual for this product consists of two volumes. Volume 1, the Operator's manual, is divided into three sections: (I) GENERAL INFORMATION, (II) INSTALLATION AND OPERATION, and (III) OPERATIONAL TEST. Volume 2, the Service manual, contains the maintenance instructions and consists of four sections, IV through VII. (See Volume 2 for a description of these sections.)

1.2 INTRODUCTION

Volume 1 of this manual provides Operator's instructions for the 626-PA-6030 Three-Phase AC Graphics Monitor plug-in module, also referred to as the 6030 plug-in. Before reading these instructions further, you should be familiar with the Mainframe information described in the Series 626 Mainframe manual.

There are two models of the 6030 plug-in: Model 626-PA-6030-1 which has barrier-type terminal strip inputs, and Model 626-PA-6030-2 which has connector inputs and mating cables. This manual is applicable to both models. Any differences in installation are noted in the text.

1.3 PURPOSE

The 6030 plug-in monitors disturbances (impulses, sags, surges, undervoltages, overvoltages, and frequency variations) on 3-phase ac power lines with either 50 or 60 Hz nominal frequency. Each phase is monitored on a single voltage range of 0 to 600V rms and 4000V pk. With user-programmable thresholds, the 6030 plug-in monitors both short- and long-term power line disturbances.

Using this plug-in, the Mainframe is able to store, analyze, classify, and print quantitative disturbance data, accompanied by a time-of-occurence printout derived from a highly accurate crystal-controlled 24-hour clock built into the Mainframe.

NOTE

When the Series 626 Mainframe is equipped with a Model 626GP Graphics Printer, graphical disturbance data can be printed in addition to the text. (Graphical presentation of data is often easier to understand and to use when analyzing operational disturbances.)

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

1.3.1 Three-Phase Monitoring

The plug-in monitors any 3-phase power line with rms (root mean square) values ranging from a low of 0 volts to a high of 600 volts. Three types of disturbances are monitored by the 6030 plug-in: power line frequency, power frequency transients, and waveform disturbances.

-- Power frequency transients are divided into five display categories:

(1) Overvoltage
(2) Undervoltage
(3) Voltage Change
(4) Voltage Surge
(5) Voltage Sag

-- Waveform disturbances, identified as "impulses" or "spikes," include all conditions that cause the power line waveform to deviate from an ideal waveform. The 6030 plug-in measures the peak amplitude of impulses and their duration. The threshold value of each type of disturbance, as well as the line frequency above which detection and printout occurs, are user-programmable. (All threshold settings are common to all three line phases.) Except for an automatic summary printout at the end of each day, disturbance data is normally printed whenever a disturbance occurs. In an alternate mode, however, a disturbance data summary printout occurs only at the end of each day. (This feature permits long-term unattended operation of the unit.)

1.3.2 Threshold Alterations

The threshold program may easily be altered by using the front panel buttons, keys, and switches. Cueing LED indicators adjacent to the programming keys simplify the programming procedure. A back-up program for the plug-in, which is stored in permanent memory at the factory, may always be recalled upon demand. Both the program and the disturbance data in the data accumulators may be printed upon demand.

NOTE

Frequency measurements are derived from phase A only, therefore, if single-phase monitoring is desired, phase A should be used.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

1.4 APPLICATIONS

When installed in the Series 626 Mainframe, the 6030 plug-in provides the capability of monitoring and evaluating power system performance. Among its typical applications are the following:

a. Determining the effect of power systems operation on equipment malfunction. Power line faults may be rapidly correlated according to errors, outages, and equipment damage in computers, industrial process controls, digital communications equipment, medical monitoring apparatus, etc. Correlation is accomplished by a time-referred fault disturbance record produced by the 6030 plug-in and printed by either the Mainframe's printer or a Graphics Printer.

b. Performing pre-installation site surveys. The 6030 plug-in can be used to determine the adequacy of existing power lines that are intended to support critical electrical equipment. (Anticipation of any power problems--before they occur--saves time, money, and future problems.)

c. Diagnostic evaluation of power system performance. The portability of the 6030 plug-in in a Mainframe makes it well suited for field use, and it is thus ideal for determining the probable causes of, and remedies for, power line disturbances.

d. Monitoring life test racks. The printouts produced by the 6030 plug-in (via the Series 626 or Graphics Printer) provide a clear record of the quality of power supplied during unattended periods of operation.

1.5 EQUIPMENT CHARACTERISTICS

The 6030 plug-in is configured as a plug-in module 6-1/2" high by 2-1/2" wide by 10" deep. It is designed for installation into the Series 626 Mainframe. The 6030 plug-in requires two of the five slots available in the Mainframe. Technical specifications for the 6030 plug-in are presented in Table 1-1.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

Table 1-1. 626-PA-6030 Technical Specifications (Page 1 of 2)

FUNCTION:	Monitor and graphically record impulses, sags, surges, undervoltages, overvoltages, and frequency variations on three channels of ac voltage.
VOLTAGE INPUT:	2-wire differential Z_{in} = 20 Megohms plus 80 pF (each side to ground)
LINE VOLTAGE MEASUREMENT:	
Range:	50 to 600V rms, 47 to 63 Hz
Resolution:	0.2V rms
Accuracy:	±1% of reading ±0.2% of F.S. (75 to 600V)
LINE FREQUENCY:	
Range:	47 to 63 Hz
Resolution:	±0.1 Hz
Accuracy:	±0.1% Hz
IMPULSE VOLTAGE MEASUREMENT:	
Range:	50 to 4000V pk (1 uSec to 2 mSec)
Resolution:	1V pk
Accuracy:	For 100V to 4000V: ±10% of reading ±1% of F.S. (5 uSec to 50 uSec.) (Decreasing to ±6 dB at 1 uSec and 2 uSec.)
IMPULSE DURATION RANGE:	1 uSec to 2 mSec
IMPULSE DURATION RESOLUTION:	1 uSec
RESOLUTION, VERTICAL:	2V on 250 volt range, 4V on 500 volt range, 8V on 1000 volt range.

cont'd

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

Table 1-1. 626-PA-6030 Technical Specifications (Page 2 of 2)

SAMPLING RATE:	7.8 kHz -- 130 samples/cycle at 60Hz. -- 156 samples/cycle at 50Hz.
GRAPHICS DATA ACCURACY:	
Line Voltage:	±5% of reading ±2.5% of F.S.
Impulses:	For >100V pk, >10 uSec, ±10% of reading ±10% of F.S. Typically -6dB @ 2 uSec.
SELECTABLE THRESHOLDS:	
Low Limit:	50 to 599V rms
High Limit:	51 to 600V rms
Voltage Sensitivity (Increases and Decreases):	2 to 60V rms
Impulse:	50 to 4000V pk
Frequency Sensitivity:	0.2 to 3.0Hz (0.1Hz increm.)
Graph Full Scale:	250V pk, 500V pk, 1000V pk, or Off (No Graph)
Selectable Graph Size:	2" or 4"

1.6 STANDARD ACCESSORIES

(The model number refers to your particular 6030 plug-in model: 6030-1 or 6030-2.)

Model #	Part #	Quantity	Description
626-PA-6030-1 (Barrier-type terminal strip inputs)	TM-112975 Vol. 1	1	Operator's Manual
	(NO AC CABLES REQUIRED)		
626-PA-6030-2 (Connector inputs and mating cables)	TM-112975 Vol. 1	1	Operator's Manual
	110480	3	AC Cables

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

1.6.1 Required Accessories

The required accessories for operating the 6030 plug-in (Model 6030-1 or 6030-2) are a Series 626 Mainframe and a Model 626GP Graphics Printer (if graphic printouts are required.) Printout sizes are selectable in two or four inches square. (Two-inch printouts show slightly less detail than four-inch printouts, but print three-times as fast.)

NOTE

You may substitute a Graphics Printer with another applicable printer. (See Appendix A for further information.)

1.7 OPTIONAL ACCESSORIES

(For Model 6030-1 or 6030-2.)

Part #	Quantity	Description
TM-112975 Vol. 2	1	Service (Maintenance) Manual

You can receive the Volume 2 manual by completely filling out and returning the Control Sheet in your Series 626 Operating manual.

1.8 FACTORY REPAIR

When factory repair is required, proceed as follows:

1. Contact Dranetz Service Corporation (formerly Dranetz Technologies, Inc., Customer Service Dept.) in order to obtain an authorization number for factory repair.

   Telephone No: (201) 755-7081 Telex: 499-7808

   TWX: (710) 997-9553 Cable: DRANETZ

2. Fill out the REPAIR/SERVICE ORDER form enclosed in the Series 626 Operating manual. Ship it along with the equipment to Dranetz Service Corp.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

SECTION II
INSTALLATION AND OPERATION

2.1 GENERAL

This section contains the installation, programming, and operating instructions for the 6030 plug-in (Models -1 and -2).

2.2 LOAD RATINGS

The Series 626 standard Mainframe has an upper limit of the combined total rating of its installed modules. The overall Mainframe capacity is set at 20 units. The individual modules (existing as of this printing) have the following load ratings:

Table 2-1. Load Ratings

Plug-in	Load Rating
626-PA-6001	2 Units
626-PA-6001 with extra option bd.	3 Units
626-PA-6002	2 Units
626-PA-6003	4 Units
626-PA-6005	2 Units
626-PA-6006	2 Units
626-PA-6007	1 Unit
626-PA-6008	2 Units
626-PA-6009	4 Units
626-PA-6011	1 Unit
626-PA-6012	2 Units
626-PA-6012A	3 Units
626-PA-6013	2 Units
626-PA-6014	1 Unit
626-PA-6015	4 Units
626-PA-6018	4 Units
626-PA-6020	4 Units
626-PA-6024A	4 Units
626-PA-6024B	4 Units
626-PA-6030	6 Units

NOTE

When selecting modules for installation into any Series 626 Mainframe, verify that the sum of the load ratings of the installed modules DOES NOT exceed 20 units.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

2.3 INSTALLATION

(Note: Two slot positions are required by the 6030 plug-in.)

To install the 6030 plug-in into the Mainframe:

WARNING

Be sure that the Series 626 Mainframe and all of the power connected to its plug-in modules are first turned OFF before proceeding with any installation.

(1) Remove the 6030 plug-in from its packaging.

(2) Position the top and bottom front corners of the plug-in module into the upper and lower tracks of two adjacent slot positions at the rear of the Series 626 Mainframe.

(3) Carefully slide the module into the Mainframe until it is firmly in position.

(4) Tighten the top and bottom captive screws in order to secure the module to the Mainframe.

2.4 CONNECTING POWER SOURCE TO MODULE

CAUTION

To avoid damaging the equipment, DO NOT apply ac voltages in excess of 600V rms to any ac phase input (A, B, or C) of the 6030 plug-in.

WARNING

Because of possible shock or fire hazards, connection of this instrument should be performed in compliance with the National Electric Code (ANSI C1), or any other requirements, or both, which may be applicable to the user.

Installation, operation, and maintenance should only be performed by qualified personnel. Your qualifications for doing so should be self-determined.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

2.4.1 Connection Procedure

The 6030 plug-in is equipped with either a barrier block connector (Model 6030-1) or three rear panel AC connectors (Model 6030-2). Inputs include phases A, B, and C. For the barrier block connectors, the terminals must be wired in accordance with the rear panel connector markings (from top to bottom: AC high, AC low, and earth ground).

(1) Turn off the Series 626 by inserting the key in FUNCTION key switch on front panel of Mainframe and setting the switch to "OFF." Unplug the Mainframe from the power source.

(2) Turn off the power source that is going to be monitored by the plug-in.

(3) Make all connections to the 6030 plug-in first.

WARNING

If you are using a Model 6030-1, be sure to replace the barrier block cover after making the connections. DO NOT proceed until you have done so.

(4) Make the desired connections to the power source that is going to be monitored.

(5) Plug the Mainframe back into the power source. Turn on the Series 626 by turning the FUNCTION Key Switch to "OPERATE."

(6) Turn on the power source that is going to be monitored.

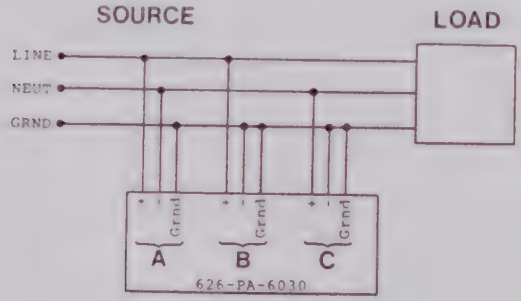
2.4.2 Circuit Applications

WARNING

Conductors connecting to measurement points should be approved for the specific use. When connected to branch circuits of 20 amperes or less, the minimum flexible cord size is No. 18 (1 mm square). For branch circuits with higher ampacity, refer to National Electric Code (ANSI C1-1975), paragraphs 240-4 and 250-95. Special consideration of ground may be required. (Refer to Article 250 of above reference if in doubt.) Outside of the United States, consult the applicable safety standards.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

The Three-phase AC monitor for 47-63 Hz may be used by itself for Normal Mode/Common Mode analysis of 1-phase lines (illustrated in Figure 2-1), for analysis of up to three separate ac signals (illustrated in Figure 2-2), for analysis of 3-phase delta lines (illustrated in Figure 2-3), or in combination with a 626-PA-6006 to do Normal Mode/Common Mode analysis on 3-phase wye lines (illustrated in Figure 2-4).



Readings:

Channel A: Line-Neutral
Channel B: Line-Ground
Channel C: Neutral-Ground

Figure 2-1. One-Phase Normal Mode/Common Mode

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

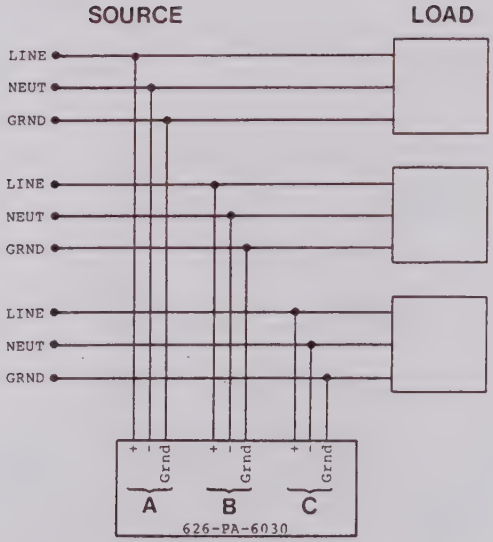


Figure 2-2. Three Separate AC Lines

Notes:

1. All channels are monitored independently.
2. All line frequencies must be the same.
3. All three channels will have the same program setup.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

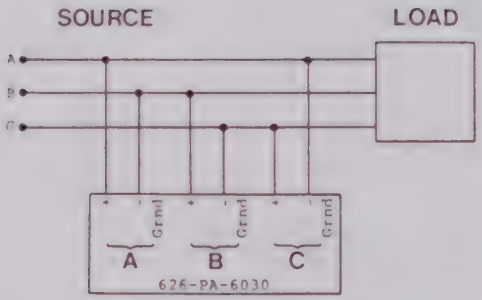


Figure 2-3. Three-Phase Delta

Notes:

1. Delta may be grounded or ungrounded.

2. Set the 6030 plug-in to monitor line-to-line voltage. For Example: For a 240 volt delta, set the High and Low limits to either side of 240V ac.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

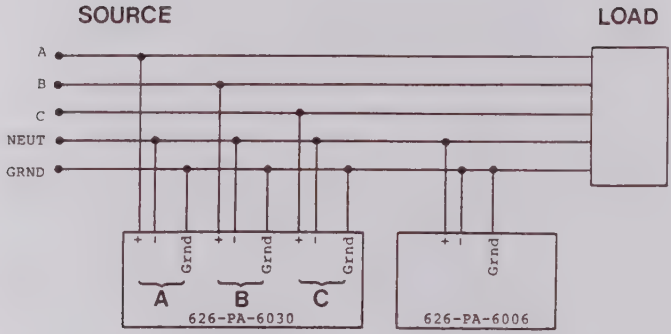


Figure 2-4. Three-Phase Wye

Notes:

1. The 6006 plug-in is added to perform Neutral-to-Ground (Common Mode) monitoring.

2. Wye distribution is normally monitored Line-to-Neutral. For Example: A 120/208 wye would be monitored with the 6030 plug-in's High and Low limits set to either side of 120V ac.

3. To monitor wye system line-to-line, set the High and Low limits to either side of the higher stated voltage. Connect the 6030 plug-in as though lines A, B, and C were from a delta. For Example: A 120/208 wye would be monitored with the 6030 plug-in's High and Low limits set to either side of 208V ac.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

2.5 MONITORING GUIDELINES

Proper monitoring and analysis of ac and dc voltage disturbances requires careful attention to the method of connection between the Series 626 Mainframe and the monitored circuit. To obtain the most accurate and relevant voltage monitoring data, follow these suggested guidelines.

(1) To minimize spurious impulse transients and interchannel coupling, always use the Dranetz test cables supplied with the Mainframe. If cables are not supplied, such as with the barrier-type terminal strip modules (Model 6030-1), the test cable should be composed of twisted-pair wires for each input channel.

(2) Test cable length should be minimized, preferably less than 8 feet from the Mainframe to the circuit connection point. This minimizes amplitude variation of impulse transients.

(3) If monitoring a power line connected to critical, sensitive load equipment, the test cable should be connected to the power line as close as possible to the load. For three-phase loads, the Mainframe should be connected in the same way as the load equipment, that is, Phase-to-Phase or Phase-to-Neutral.

(4) Use of instrument-grade Potential Transformers for monitoring impulses on high voltage power lines is not recommended. The limited frequency response of most Potential Transformers may result in substantial variation of impulse amplitude.

(5) The Mainframe is designed to operate from disturbed power lines, therefore, its power supply may be connected to the same power line that is being monitored. However, be aware that the extensive transient suppression incorporated with the Mainframe power supply may alter the transient characteristics of the ac power line that the power supply is connected to.

    To prevent alterations of the transient characteristics of the power line being monitored, separate the Mainframe's power supply input from the monitored inputs.

(6) The ground terminals of the plug-in modules are connected internally to the safety grounding conductor in the Mainframes's power plug. Be careful not to inadvertently contaminate a "clean" ground with a "dirty" ground.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

2.6 OPERATING THE 6030 PLUG-IN

2.6.1 Operating Controls and Indicators

The functions of the Mainframe operating controls and indicators associated with 6030 plug-in operation are described in Table 2-3. Figure 2-5 illustrates the typical front panel controls on a Series 626 that are associated with a 6030 plug-in. For a description of controls common to overall Series 626 operation, refer to Volume 1 of the Mainframe manual.

Table 2-3. 6030 Plug-in Operating Controls

ITEM	FUNCTION
Numerical Keys*	Used to enter numerical values for the various functions.
[LO LIMIT] Key	When pressed, enables numerical keyboard to program Low limit voltage.
[HI LIMIT] Key	When pressed, enables numerical keyboard to program High limit voltage.
[SENS] Key	When pressed, enables numerical keyboard to program voltage sensitivity threshold.
[IMP SENS] Key	When pressed, enables numerical keyboard to program frequency sensitivity threshold.
[F SENS] Key	When pressed, enables numerical keyboard to program frequency sensitivity value.
[ENTER] Key	When pressed, transfers the entered numerical value into the plug-in's memory.
[CLEAR ENTRY] Key	When pressed, cancels the current numerical sequence being entered.
[RANGE] Key	When pressed, enables numerical keyboard to program the full scale range of the graphs produced by an attached printer; also, allows selection of 2" or 4" graph size.
[PROG] Button*	Produces Prog. Summary printout when pressed.
[DATA] Button	Produces Data Summary printout when pressed.
[PRESET] Button	With FUNCTION key switch set to "PROGRAM," pressing [PRESET] recalls the non-volatile "Factory Preset" program for the last channel pressed or currently depressed.

* -"Key" and "Keyboard" represent the red, green, and yellow keys; "Button" represents the black selector buttons.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

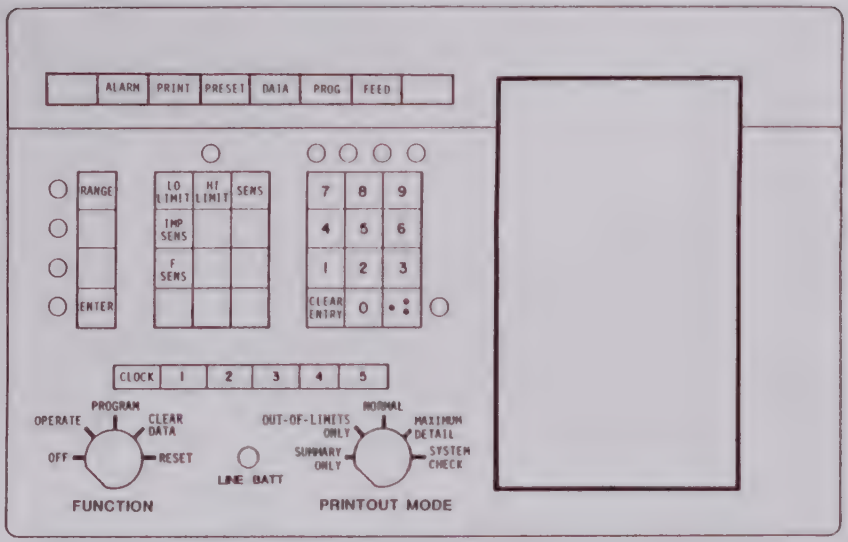


Figure 2-5. Series 626 Controls used by the 6030 Plug-in

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

2.6.2 Programming Procedure

The easiest and clearest way to learn the programming of the 6030 plug-in is through an illustrated example.

Assume it is desired to program:

-- A graph size of 2 inches,
-- a full scale graph range of 250V,
-- a high limit of 125V,
-- a low limit of 105V,
-- a voltage sensitivity of 2V,
-- a frequency sensitivity of 0.2Hz,
-- and an impulse sensitivity of 50V.

The voltage and frequency sensitivities set the deviation from the present value, above or below which a detected value produces a recorded disturbance.

For impulse measurements, the sensitivity corresponds to the absolute threshold, so that for an impulse sensitivity of 25 volts, a disturbance is recorded when the impulse amplitude rises above 25 volts.

NOTES

1) It is recommended that the high and low limits be set to at least 3V (respectively) from the nominal voltage being measured. For example, if monitoring 120V, the high limit should be set to at least 123V and the low limit to at most 117V.

2) It is also recommended that the sensitivity be set to at least 2% of the nominal input voltage.

For this example, program the 6030 plug-in as follows:

(1) Set the FUNCTION key switch to "PROGRAM"; set the PRINTOUT MODE key switch to "NORMAL."

(2) Since the 6030 plug-in occupies two slots, push the lower of the two black buttons of the the two slots being occupied (for example, [2], when slots 2 and 3 are occupied.) Note that a Program Summary for that channel is immediately printed.

(3) The cueing indicator above the left bank of keys lights, indicating that [RANGE] should now be pressed.

(4) Press [RANGE] A printout such as the one on the top of the next page will be printed. Press [1] on the keyboard to select the 2" graph size and then press [ENTER].

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

The menu mentioned in step (4) appears as follows:

626*

```
2 = 4"
1 = 2"
0 = NO GRAPH
SELECT GRAPH SIZE
```

626A*

```
SELECT GRAPH SIZE
 0 = NO GRAPH
 1 = 2"
 2 = 4"
```

(5) The following menu will then be printed:

626

```
3 = 1000 VPK
2 = 500 VPK
1 = 250 VPK
0 = NO GRAPH
FOR GRAPH
SELECT FULL SCALE
```

626A

```
SELECT FULL SCALE
FOR GRAPH
 0 = NO GRAPH
 1 = 250 VPK
 2 = 500 VPK
 3 = 1000 VPK
```

(6) Press [1] and [ENTER] to select the 250V range.

(7) Press [HI LIMIT]. Program the high limit value (125) using the keyboard to type the numerical entries.**

NOTE

The instrument is designed to detect an invalid entry and to automatically shift high and low limits.

(8) When the ENTER LED lights, press [ENTER]. The programmed high limit will be echoed back on the printout and the ENTER LED will go out.

(9) Press [LO LIMIT] and program the low limit value (105) using the keyboard to type the numerical entries, followed by [ENTER]. The programmed low limit will be echoed back on the printout and the ENTER LED will go out.

(10) Press [SENS] and program the voltage sensitivity (02) using the keyboard to type the numerical entries, followed by [ENTER]. The programmed voltage sensitivity will be echoed back on the printout and the ENTER LED will go out.

---

* -If you are using a Model 626 Mainframe, refer to the "626" printouts (read up) in this manual; if you are using a Model 626A, refer to the "626A" printouts (read down) instead.

** -If an incorrect entry is made, press [CLEAR ENTRY] and the current sequence of numerical entries will be erased, allowing the correct sequence to be retyped.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

(11) Press [F SENS] and program the frequency sensitivity (0.2), using the numerical keyboard to type the numerical entries, followed by [ENTER]. The programmed frequency sensitivity will be echoed back on the printout and the ENTER LED will go out.

(12) Press [IMP SENS] and program the impulse sensitivity (0050), using the numerical keyboard to type the numerical entries, followed by [ENTER]. The programmed impulse sensitivity will be echoed back on the printout and the ENTER LED will go out.

(13) Press [PROG] to obtain a Program Summary printout for verification.

The completed program printout should appear as follows:

626

```
IMPULSE SENS 0050V
FREQ SENS   0.2 HZ
VOLTAGE SENS 002 V
V LOW LIMIT  105 V
V HIGH LIMIT 125 V
GRAPH F.S. 250 VPK
GRAPH SIZE 2"
   626-PA-6030
      CH 2
PROGRAM SUMMARY
```

626A

```
PROGRAM SUMMARY
      CH 2
   626-PA-6030
GRAPH SIZE 2"
GRAPH F.S. 250 VPK
V HIGH LIMIT 125 V
V LOW LIMIT  105 V
VOLTAGE SENS 002 V
FREQ SENS   0.2 HZ
IMPULSE SENS 0050V
```

(14) When the plug-in program is completed, you can proceed to program another module (by pressing another channel number), or you can place the instrument on-line by setting the FUNCTION key switch to "OPERATE." While on-line, the Program Summary of program in effect may be obtained by simply pressing the [PROG].

2.6.3 Selecting the Factory Preset Program

Custom Preset Option 101 allows you to choose your own program setup (programmed at the factory) for the PRESET function.

(1) To select the program stored in the Mainframe's permanent memory, set the FUNCTION key switch to "PROGRAM" and press the desired channel number. The last Operator-set program will be printed as illustrated on the next page.

(2) Press [PRESET] to recall the Factory Preset program. An example of this sequence appears on the next page. In the example, the differences in the Operator's and Factory Preset programs are listed at the top of the next page.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

	Operator's	Factory Preset
Impulse Sensitivity:	50V	100V
Frequency Sensitivity:	0.2Hz	0.5Hz
Graph F.S:	500V pk	250V pk
Graph Size	2"	4"

626

```
IMPULSE SENS 0100V
FREQ SENS  00.5 HZ
VOLTAGE SENS  002V
V LOW LIMIT  105 V
V HIGH LIMIT 125 V
GRAPH F.S.  250VPK
GRAPH SIZE 4"
   626-PA-6030
      CH 2
 PROGRAM SUMMARY
```

```
IMPULSE SENS 0050V
FREQ SENS  00.2 HZ
VOLTAGE SENS  002V
V LOW LIMIT  105 V
V HIGH LIMIT 125 V
GRAPH F.S.  500VPK
GRAPH SIZE 2"
   626-PA-6030
      CH 2
 PROGRAM SUMMARY
```

626A

```
PROGRAM SUMMARY
      CH 2
 626-PA-6030
GRAPH SIZE 2"
GRAPH F.S.  250VPK
V HIGH LIMIT 125 V
V LOW LIMIT  105 V
VOLTAGE SENS  002V
FREQ SENS  00.5 HZ
IMPULSE SENS 0100V
```

```
PROGRAM SUMMARY
      CH 2
 626-PA-6030
GRAPH SIZE 4"
GRAPH F.S.  250VPK
V HIGH LIMIT 125 V
V LOW LIMIT  105 V
VOLTAGE SENS  002V
FREQ SENS  00.5 HZ
IMPULSE SENS 0100V
```

2.7 DESCRIPTION OF DATA PRINTOUTS

When any of the disturbances described below is detected by the 6030 plug-in, it is recorded and displayed in the listed manner. In addition, if the Graphics Printer (or similar) is connected, graphical disturbance printouts will also be obtained. The printouts of Subsections 2.7.1 through 2.7.6 represent printouts that would be obtained by either the Mainframe's printer or by a connected Graphics Printer. If a Graphics Printer were connected, waveforms of the disturbances would also be displayed (in 2" or 4" sizes, as desired).

NOTES

If a Graphics Printer (or similar) is connected, you should disable the Mainframe's printer, since its display is repetitive with the Graphics Printer's display. Pressing [PRINT] will disable the Mainframe's printer; pressing [PRINT] again (toggle button) re-enables it.

In disturbance printouts of subsections 2.7.1 through 2.7.5, voltage levels are based on waveform rms values.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

2.7.1 Overvoltage

An overvoltage condition exists when the monitored power line voltage exceeds the user-specified upper limit for more than 2.55 seconds. An overvoltage condition is indicated by a printout such as the following:

```
4B  HI  09:46:07.11
```

where 4 is the channel number, B is the phase, and time is given in hours, minutes, and seconds (to the 0.01 second resolution).

When the line voltage returns to normal (within limits), a printout such as the following occurs:

626

```
4B  NOR  09:46:15.20
    148.6  V  MAX
```

626A

```
    148.6  V  MAX
4B  NOR  09:46:15.20
```

The printout indicates the time when normal voltage was restored and the highest voltage reached during the overvoltage interval.

2.7.2 Undervoltage

An undervoltage condition exists when the monitored power line voltage remains below the user-specified lower limit for more than 2.55 seconds. An undervoltage condition is indicated by a printout such as the following:

```
4C  LO  09:46:15.20
```

When the line voltage returns to normal (within limits), a printout such as the following occurs (see next page):

626

```
4C  NOR  09:46:18.45
    36.4  V  MIN
```

626A

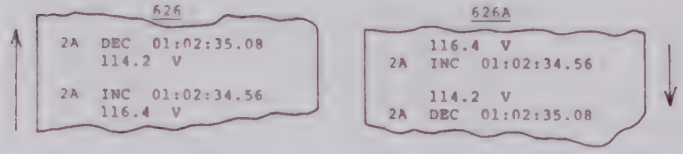
```
    36.4  V  MIN
4C  NOR  09:46:18.45
```

The printout indicates the time when normal voltage was restored and the lowest voltage reached during the undervoltage condition.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

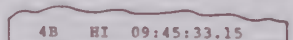
2.7.3 Voltage Change

A voltage change printout is triggered when the line voltage changes more than a preselected amount from the last printed value. The voltage change sensitivity is a user-selected integer voltage between 2 and 60 volts. The following example shows an increase to 116.4 volts followed by a decrease to 114.2 volts at the times shown (assume 2V sensitivity).



2.7.4 Voltage Surge

A Voltage Surge is defined as a line voltage which increases through a user-selected upper limit and then returns to an in-tolerance condition in less than 2.56 seconds. When a surge begins, its starting time is printed as follows:



When the line voltage returns to a normal level following a Surge condition, a message such as the following is printed:

The printout indicates the time when the voltage returned to normal (within limits), as well as the highest voltage reached and the surge duration.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

2.7.5 Voltage Sag

A voltage Sag is defined as a line voltage that decreases below the user-selected lower limit and then returns to an in-tolerance condition in less than 2.56 seconds. Sag printouts take the same form as surge printouts, with the terms SAG replacing SURGE, MIN replacing MAX, and LO replacing HI. When a sag begins, its starting time is printed as follows:

```
4B   LO  09:45:34.25
```

When the line voltage returns to a normal level following a Sag condition, a message such as the following is printed:

626

```
4B   NOR  09:45:34.40
     102.2  V  MIN
     SAG  0.26 SEC
```

626A

```
     SAG  0.26 SEC
     102.2  V  MIN
4B   NOR 09:45:34.40
```

NOTE

Voltage inputs of less than 25V rms will be printed as 0.0V by the 6030 plug-in.

2.7.6 Impulses

"Impulse" disturbances represent any line perturbation which contains frequency components in the 300 Hz to 500 kHz range. An impulse-type disturbance produces a printout such as the following:

626

```
2A IMP 10:12:13.45
  0139 V, 0010 US
```

626A

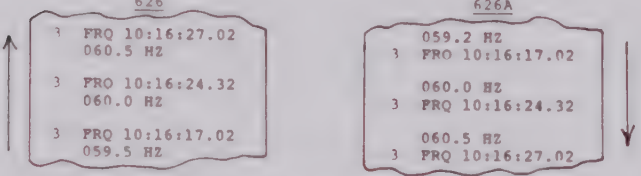
```
  0139 V, 0010 US
2A IMP 10:12:13.45
```

The printout indicates that an impulse which deviated from normal line voltage by 139 volts, peak, and with a 10 microsecond duration, was detected on phase A of Channel 2 at the time shown. The impulse magnitude is measured with respect to the instantaneous point on the power frequency sine wave where it occurs.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

2.7.7 Frequency Change

A frequency change printout is triggered whenever the line frequency changes by more than a preselected amount from the last printed value. The frequency change sensitivity is a user-selected value between 0.2 Hz and 3.0 Hz (in 0.1Hz increments). The following example shows several frequency change printouts (assume a frequency sensitivity of 0.5Hz).



NOTE

When using a Graphics Printer, a frequency change distribution will not cause a corresponding graph to be printed.

2.8 DESCRIPTION OF GRAPHIC PRINTOUTS

(Refer to the Graphics Printer Operator's manual for more information on operating your 6030 plug-in with a Graphics Printer.)

With the Model 626GP Graphics Printer attached, graphs will be plotted for each disturbance as long as there is sufficient memory to store the event.

NOTE

If two or more disturbances on the same phase are recorded with the same time signature, only one graph will be entered.

The memory in the 6030 plug-in is capable of storing twelve cycles worth of data. Since three cycles are required for each graph, four non-overlapping graphs can always be printed and as many as 10 may possibly be printed. (The exact number of graphs stored cannot be determined since it is affected by the number of disturbances and the time elapsed between them.)

When the graphic memory is full, the 6030 plug-in will continue monitoring and printing disturbances, but in text only. The graphical printouts will resume when there is sufficient free memory.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

2.9 VARIOUS PRINTOUT MODES

The setting of the PRINTOUT MODE key switch on the front panel of the Series 626 Mainframe determines the amount of detail which is printed from any disturbance. The further clockwise the key is turned, up to the SYSTEM CHECK position, the more detail that is printed regarding a disturbance. Below is a list of the four key switch positions and the amount of detail printed when the PRINTOUT MODE key is in each position.

SUMMARY ONLY

The Series 626 printer and Graphics Printer are both inhibited. All data acquired by the 6030 plug-in is stored in the Series 626's daily accumulator. A daily summary is printed at midnight (Series 626 time), or when the black [DATA] button is pressed.

OUT-OF-LIMITS-ONLY

Disturbance data is ONLY printed when the disturbance is recorded as out-of-limits (the averaged sensitivity deviations such as voltage and frequency changes are not printed).

NORMAL

A moderately detailed printout of any disturbances recorded by the 6030 plug-in is printed.

MAXIMUM DETAIL

A highly detailed printout of any disturbances recorded by the 6030 plug-in is printed. When printing graphs, all three phases are graphed for each disturbance.

2.9.1 Example Printouts using a Graphics Printer

The printouts of the following subsections illustrate some of the various printouts obtained when disturbances are recorded by the 6030 plug-in. The waveforms were printed by a Graphics Printer. It is assumed that the limits were programmed as follows:

Graph F.S: 250V pk (Size: 4")	Voltage Sensitivity: 20V
Voltage High Limit: 125V	Frequency Sensitivity: 0.5Hz
Voltage Low Limit: 105V	Impulse Sensitivity: 100V

NOTE

Disturbances which occur while the PRINTOUT MODE switch is in the "SUMMARY ONLY" position do not generate individual printouts, but are stored in the daily accumulator and are automatically printed each day at midnight (worst case event and number of occurrences in each category). This printout may also be triggered manually by pressing the [DATA] button.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

2.9.1.1 Impulse Disturbance Printout

Figure 2-6 below is a printout of an Impulse (spike) of 355 volts which lasted 13 microseconds. The printout would be the same in the Out-Of-Limits Only, Normal, and Maximum Detail Modes. If a Graphics Printer were not used, the Mainframe's printer would simply print:

626

```
4A IMP 09:18:17.56
 0355 V,  0013 uS
```

626A

```
 0355 V,  0013 uS
4A IMP 09:18:17.56
```

However, with a Graphics Printer installed, not only is the text printed but the waveform as well:

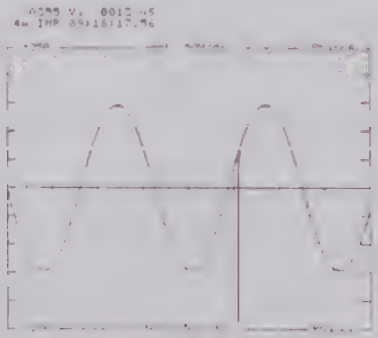


Figure 2-6. Impulse Waveform Printed by the Model 626GP

2.9.1.2 Surge Disturbance Printout

Figure 2-7 is a printout of a Surge which lasted 0.35 seconds and reached a maximum of 138.0 volts. The printout of Figure 2-7 would occur in the Out-of-Limits Only Mode--a waveform is printed when the voltage goes out of limits and another is printed when the voltage returns to normal (within limits). If the PRINTOUT MODE key switch were set to "NORMAL," every increase or decrease of the voltage (exceeding the 20V threshold) would also trigger a disturbance printout and a graph. If the PRINTOUT MODE key switch were set to "MAXIMUM DETAIL," all three phases (A, B & C) would be printed whenever a disturbance is detected (increases and decreases included).

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

Without a Graphics Printer, the Mainframe's printer would print:

626

```
3A NOR 10:20:55.99
   138.0 V MAX
   SURGE 0.35 SEC

3A INC 10:20:55.64
   134.0 V

3A HI  10:20:55.64
```

626A

```
3A HI  10:20:55.64

   134.0 V
3A INC 10:20:55.64

   SURGE 0.35 SEC
   138.0 V MAX
3A NOR 10:20:55.99
```

However, if a Graphics Printer were installed the following would be printed (note that the waveform partially overlaps itself):

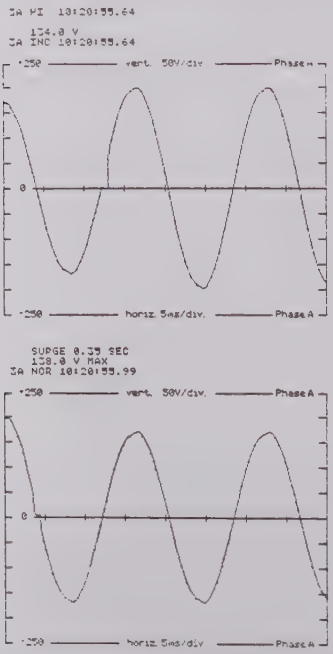


Figure 2-7.

Surge Waveform Printed by the Model 626GP

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

2.9.1.3 Overvoltage Disturbance Printout

Because an Overvoltage disturbance "HI" waveform is nearly identical to a Surge waveform, an example printout is not presented. The only difference in the text would be that the duration of the disturbance would be more than 2.55 seconds (by definition).

2.9.1.4 Sag Disturbance Printout

Figure 2-8 is a printout of a Sag which lasted 0.35 seconds and reached a minimum of 78.6 volts. The printout would occur in the Normal Mode--a waveform is printed when the voltage goes out of limits, each time it crosses the voltage sensitivity threshold of 20V, and finally when the voltage returns to within limits.

Without a Graphics Printer, the Mainframe's printer would print:

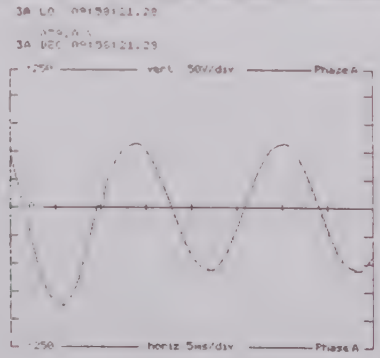
626

```
3A NOR 09:58:21.63
   078.6 V MIN
   SAG   0.35 SEC

3A INC 09:58:21.61
   099.0 V

3A DEC 09:58:21.28
   079.0 V

3A LO  09:58:21.28
```

626A

```
3A LO  09:58:21.28

   079.0 V
3A DEC 09:58:21.28

   099.0 V
3A INC 09:58:21.61

   SAG   0.35 SEC
   078.6 V MIN
3A NOR 09:58:21.63
```

However, if a Graphics Printer were installed the following would be printed (note that the waveform partially overlaps itself):



(Cont'd)

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

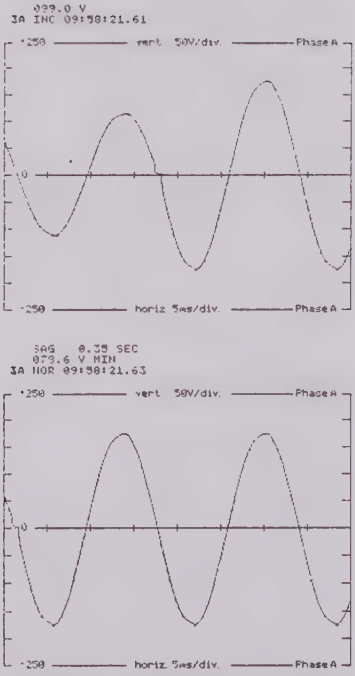


Figure 2-8. Sag Waveform Printed by the Model 626GP

2.9.1.5 Alternate Example of a Sag Disturbance Printout

While a sag is often gradual (as indicated in Figure 2-8), there are times when a sag can be an abrupt dropout. Having a waveform graph of the disturbance, such as that in Figure 2-9, makes it easier to visualize an abrupt disturbance. (Note that the waveform partially overlaps itself.)

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

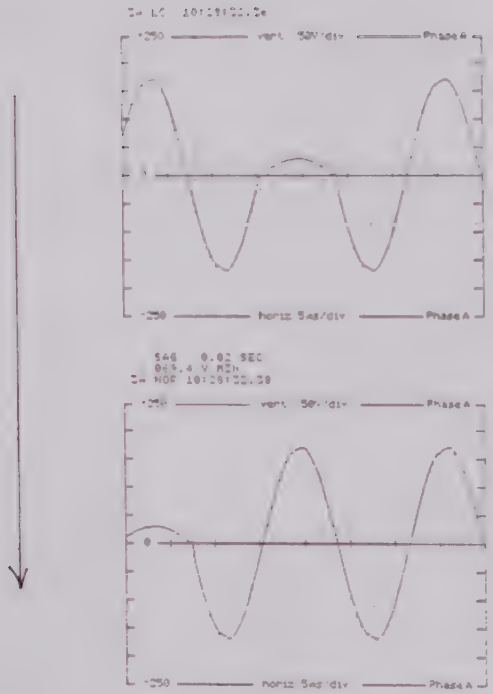


Figure 2-9. Alternate Sag Waveform Example

2.9.1.6 Undervoltage Disturbance Printout

Because an Undervoltage disturbance "LO" waveform is nearly identical to the Sag waveform, an example printout is not presented. The only difference in the text would be that the duration of the disturbance would be more than 2.55 seconds (by definition).

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

2.10 AUTOMATIC GRAPH SUPPRESSION

NOTE

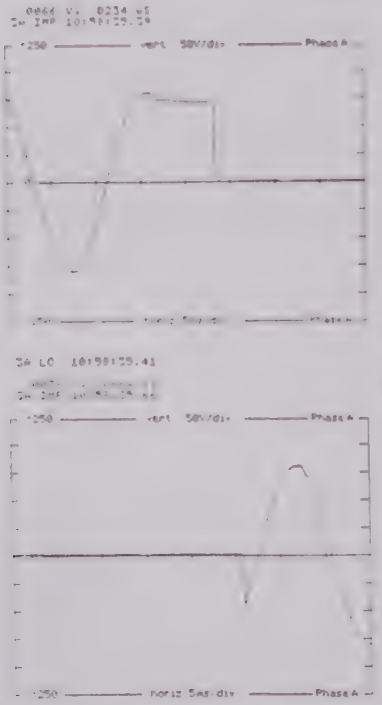
This subsection applies to 6030 plug-ins with Version 2.8 or later software.

For 6030 plug-ins with Version 2.8 or later software, there will be occasions when a graph is not printed for an event, even though there is empty memory available.

A graph will be suppressed (deleted) when the plug-in determines that the graph will contain no additional information other than that found in the previous graph.

This condition will only occur when part of the suppressed graph overlaps the previous graph within 20 milliseconds. This will most likely occur if the monitored power line drops out and then returns to normal. An example of such a condition is given on the following page (Figure 2-10).

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.



A graph which would just show the continuation of the zero voltage dropout is suppressed from being printed here.

Figure 2-10. Suppressed Graph Example

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

SECTION III
OPERATIONAL TEST

3.1 GENERAL

This section provides information for performing an operational test to verify that the 6030 plug-in is operating properly.

3.2 SYSTEM CHECK

(1) Turn the PRINTOUT MODE key momentarily to the "SYSTEM CHECK" position, and then back to "NORMAL."

When the PRINTOUT MODE key switch is turned to "SYSTEM CHECK," a source of precise signals is applied to the front-end circuitry of the 6030 plug-in. Any inputs connected at this time will be automatically disconnected during the system check period. Successful measurement of these signals verifies that the plug-in module is fully operational.

(2) Compare the actual displayed readings with those is subsection 3.2.1 below. If any readings are out of range, contact Dranetz Service Corporation for further instructions (see subsection 1.8, FACTORY REPAIR.)

3.2.1 System Check Tolerances

AC Voltage ..... 196.0 to 204.0 Volts

Impulse Peak ..... 1800 to 2200 Volts

Impulse Duration ... 8 to 12 Microseconds

Frequency ..... 59.8 to 60.2 Hertz

3.2.2 Example System Check Printout

The display on the following page illustrates an example System Check printout of a 6030 plug-in.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

626

```
••••••••••••••••••

IMP- 2995V,    10US
AC VOLTS      200.0V
        PH C
IMP- 2885V,    10US
AC VOLTS      200.4V
        PH B
IMP- 3010V,    11US
AC VOLTS      201.6V
        PH A
FRQ      60.0 HZ
   626-PA-6030
        CH 1

05/30/86  14:53:25
***SYSTEM CHECK***
```

626A

```
***SYSTEM CHECK***
05/30/86  14:53:25

        CH 1
   626-PA-6030
FRQ      60.0 HZ
        PH A
AC VOLTS      201.6V
IMP- 3010V,    11US
        PH B
AC VOLTS      200.4V
IMP- 2885V,    10US
        PH C
AC VOLTS      200.0V
IMP- 2995V,    10US

••••••••••••••••••
```

The above printout verifies the operational integrity of the 6030 plug-in for all three measurement phases (A, B, and C). The plug-in passes the System Check because all values are within the tolerances of Subsection 3.2.1.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

APPENDIX A

A.1 GENERAL

The Series 626 Mainframe's front panel printer cannot produce graphic displays, therefore, another printer must be used when graphs are required. The 6030 plug-in is designed to be used in conjunction with the Dranetz Model 626GP Graphics Printer, however, it is also possible to use the 6030 plug-in with other printers. The information in the following subsections provides information on how to use the plug-in with and Epson FX-100+ (or compatible) printer.

A.2 TRANSMISSION OF GRAPHICS DATA

Graphics data is only available at the Series 626 Mainframe's RS-232C port which is located on its rear panel (DCE Communications port, connector J2).

When transmitting graphics information, the data format is:

-- 8 bits,
-- no parity,
-- and 2 stop bits.

DTR handshaking is used on the Series 626. The control codes used by the 6030 plug-in are Epson FX-100+ compatible as listed in the following examples. In the examples, "$" indicates a hexadecimal number and "CHR$( )" indicates a character string, not an ASCII character. ASCII characters are indicated by "A", "K", "0", "ESC", etc.

NOTE

The Series 626 Mainframe's Communications Port must be set to at least 1200 baud, its default, or else the time it will take to print graphs will be impracticle.

Control Codes used by the
Graphics Printer and Epson FX-100+ Printer

Control Codes for Line Spacing:

"ESC","0" = $1B,$30 --- Sets line spacing for text mode.

"ESC","A",CHR$(8) = $1B,$41,$08 --- Sets line spacing for graphics mode, line spacing is approximately 8/72 inch standard.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

Control Codes for Dot Graphics:

"ESC","K",CHR$(n1),CHR$(n2) --- Turns on graphics mode where n1,n2 form a 16-bit binary number indicating the number of graphics columns to print. The lsb is n1=n(MOD 256); the msb is n2=INT(n/256)

For Example: To send 320 columns of graphics, the following string of characters would be transmitted:

"ESC","K",CHR$(64),CHR$(1) = $1B,$4B,$40,$01

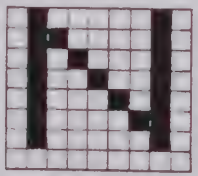
Graphics columns are encoded as follows:

The TRUE state of "1" causes a dot to be printed. The least significant bit (lsb) of the number transmitted controls the lowest dot of the 8-dot column. The most significant bit (msb) of the number transmitted controls the highest dot of the 8-dot column.

For Example: The graphic string:

$00,$FE,$40,$20,$10,$08,$04,$FE,$00

would print the letter "N" as illustrated below.



Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

RS-232C Pin Connections:

The RS-232C signals used by the Series 626 are described in Table A-1 below along with the connections to a compatible printer.

Table A-1. RS-232C Signals used by the Series 626

PIN	NAME	DIRECTION	DESCRIPTION
1	GND	N/A	Shield of interface cable should be connected to this pin which is tied to the frame ground internally to the Series 626.
2	XMT	To Series 626	Serial data outputted from connected device is sent to the Series 626. RTS and DTS must be TRUE for the data to be recognized.
3	RCV	From Series 626	Serial data is outputted by the Series 626 to the connected device provided DTR and RTS are TRUE.
4	RTS	To Series 626	Used to temporarily suspend transmission of data from the Series 626 in the Graphics Mode. This signal must be TRUE for the Series 626 to recognize the presence of a connected device. A FALSE state for more than 10 seconds* will cause the "RS-232C PORT LOST" message to be printed and appropriate action to be taken.
5	CTS	From Series 626	This signal will be TRUE as long as the ACIA and driver circuitry of the RS-232C port of the Series 626 are operational.
7	GND	N/A	Signal ground, internally connected in the Series 626 to pin 1.
20	DTR	To Series 626	This signal must be TRUE for the Series 626 to acknowledge the presence of a connected device. FALSE state causes an immediate disabling of the port.

* - This is true only when printing graphics information. When printing text messages, 240 milliseconds is the maximum time that this signal can be FALSE.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

WARNING

Because of possible shock or fire hazards, connection of this instrument should be performed in compliance with the National Electrical Code (ANSI C1) and/or any other requirements which may be applicable to the user.

Installation, operation, and maintenance should be performed only by qualified personnel.

TM-111200

VOLUME 1

OPERATING MANUAL

REMOTE MONITOR UNITS
626-RMU-1 626-RMU-3 626-RMU-3A
626-RMU-3H 626-RMU-3AH

REMOTE MONITOR INTERFACE ADAPTER
626-PA-6036

NOTE: Refer to Volume 2 (Service Manual) of TM-111200 for maintenance data.

1 May 1984
(Rev. 1 July 1984)
(Rev. 15 June 1985)
(Rev. 1 Sept. 1985)
(Rev. 1 July 1986)
(Rev. 15 Dec. 1986)

© COPYRIGHT 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. EDISON, NEW JERSEY.
ALL RIGHTS RESERVED.

DRANETZ
DRANETZ TECHNOLOGIES, INCORPORATED
1000 New Durham Rd., PO Box 4019, Edison, NJ 08818-4019

NOTICE REGARDING DRANETZ' PROPRIETARY RIGHTS

This publication contains information proprietary to Dranetz Technologies, Inc. By accepting and using this manual, the user agrees that the information contained herein will be used solely for the purpose of repairing or operating equipment of Dranetz Technologies, Inc. These manuals are to be returned to Dranetz Technologies, Inc. when no longer required by the user, or when there is a change in ownership of the equipment.

These publications are protected under the Copyright laws of the United States Title 17 et seq. No part of this publication may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language or computer language, in any form, by any means, electronic, mechanical, magnetic, optical, chemical, manual, or otherwise, without the expressed written consent of Dranetz Technologies, Incorporated, 1000 New Durham Road, PO Box 4019, Edison, New Jersey 08818-4019.

TABLE OF CONTENTS

REMOTE MONITOR UNITS 626-RMU-1, -3, -3A, -3H, AND -3AH
AND
626-PA-6036 REMOTE MONITOR INTERFACE ADAPTER

Section			Page
I	GENERAL INFORMATION		
1.1	Scope		1-1
1.2	Introduction		1-1
1.3	Purpose		1-1
1.3.1		626-RMU-1	1-2
1.3.2		626-RMU-3 and -3H	1-2
1.3.3		626-RMU-3A and -3AH	1-2
1.3.4		626-PA-6036	1-2
1.4	Applications		1-6
1.5	Event Recording Capability		1-7
1.5.1		Sag	1-8
1.5.2		Surge	1-8
1.5.3		Low Line	1-8
1.5.4		High Line	1-8
1.5.5		Impulse	1-8
1.5.6		Neutral	1-8
1.5.7		Power Loss	1-8
1.5.8		DC Average (RMU-3 and -3H Only)	1-9
1.5.9		DC Impulse	1-9
1.5.10		Sequential Events	1-9
1.6	Unit History		1-9
1.7	Standard Accessories		1-10
1.8	Optional Accessories		1-11
1.9	Factory Repair		1-11
II	OPERATION		
2.1	LED Display		2-1
2.2	Power Supply		2-1
2.2.1		AC Voltage Selection	2-2
2.2.2		Replacement of Fuse	2-2
2.3	Communicating with the RMU		2-2
2.3.1		Initial Power-Up to RMU	2-3
2.3.2		Using the 626-PA-6036 Plug-In Module	2-3
2.3.3		RMU Communication Characteristics	2-4
2.3.4		Main Menu Selections	2-7
2.3.5		Programming Thresholds	2-13
2.3.6		Data Printouts	2-15
2.4	Connection of Monitored Inputs		2-21
2.5	Internal Batteries		2-24

COPYRIGHT © 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

TABLE OF CONTENTS (CONT'D)

Section			Page
III	OPERATIONAL TESTS		
	3.1	General	3-1
	3.2	Diagnostics	3-1

LIST OF ILLUSTRATIONS

Figure		Page
1-1	Series 626 with 626-RMU-3	1-0
1-2	626-RMU-1 Front and Rear Views.	1-3
1-3	626-RMU-3 Front and Rear Views.	1-4
2-1	626-RMU-3 and -3H AC Input Connections.	2-22
2-2	626-RMU-3A and -3AH AC Input Connections.	2-23

LIST OF TABLES

Table		Page
1-1	Specification Summary	1-2
1-2	RMU Unit History Events	1-10
2-1	Series 626 Front Panel Keys and ASCII Equivalents . .	2-5
2-2	RMU Communication Interface Connections	2-5
2-3	626-PA-6016 Communication Interface Connections . . .	2-6
2-4	Allowable Ranges of Programmable Thresholds	2-15
3-1	Diagnostic Codes.	3-2

COPYRIGHT © 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

STATEMENT OF WARRANTY

ALL PRODUCTS OF DRANETZ TECHNOLOGIES, INC. ARE WARRANTED TO THE ORIGINAL PURCHASER AGAINST DEFECTIVE MATERIAL AND WORKMANSHIP FOR A PERIOD OF ONE YEAR FROM THE DATE OF DELIVERY. DRANETZ WILL REPAIR OR REPLACE, AT ITS OPTION, ALL DEFECTIVE EQUIPMENT RETURNED, FREIGHT PREPAID, DURING THE WARRANTY PERIOD, WITHOUT CHARGE FOR REPAIR, PROVIDED THERE IS NO EVIDENCE THAT THE EQUIPMENT HAS BEEN MISHANDLED OR ABUSED. THIS WARRANTY SHALL NOT APPLY TO ANY DEFECTS RESULTING FROM IMPROPER OR INADEQUATE MAINTENANCE, BUYER-SUPPLIED HARDWARE/SOFTWARE OR INTERFACING, UNAUTHORIZED MODIFICATION OR MISUSE OF THE EQUIPMENT, OPERATION OUTSIDE OF THE ENVIRONMENTAL SPECIFICATIONS FOR THE PRODUCT, OR IMPROPER SITE PREPARATION OR MAINTENANCE.

The information in this manual has been reviewed and is believed to be entirely reliable. No responsibility, however, is assumed for any inaccuracies. The material in this manual is for information purposes only, and is subject to change without notice.

Figure 1-1. Series 626 with 626-RMU-3

COPYRIGHT © 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

VOLUME 1
OPERATOR'S MANUAL

REMOTE MONITOR UNITS 626-RMU-1, -3, -3A, -3H AND -3AH
AND 626-PA-6036 REMOTE MONITOR INTERFACE ADAPTER

SECTION I
GENERAL INFORMATION

1.1 SCOPE

This manual consists of two volumes. Volume 1, the Operator's Manual, is divided into three sections: I) GENERAL INFORMATION, II) INSTALLATION AND OPERATION, and III) OPERATIONAL TEST. Volume 2, the Service Manual, contains the maintenance instructions.

1.2 INTRODUCTION

This manual provides instructions for the operation of the 626-RMU Remote Monitor Units and the 626-PA-6036 Remote Monitor Interface Adapter plug-in used with the Series 626 Universal Disturbance Analyzer. (See fig. 1-1.) Since there are several models of the 626-RMU, the terms "Remote Monitor" and "RMU" will be used when describing features common to all versions. Familiarity with the 626 mainframe (as described in Volume 1 of the Mainframe manual) is assumed.

1.3 PURPOSE

The Remote Monitors are power line monitors designed for low cost, convenience of installation, and secure unattended operation. Each unit is a small, self-contained instrument capable of detecting various power line disturbances. The 626-PA-6036 plug-in allows the 626 to communicate with the RMU, using the 626 keyboard and printer for programming and data printout. Once programmed, the RMU may be disconnected from the 626 and left alone to monitor the desired power line. The RMU may be reconnected to a 626 at any time for data printout or reprogramming. The connection between the RMU and the 626 may be made with an interface cable or over telephone lines with optional modems. Various CRT and printing terminals may also be used to communicate with the RMU.

Events are categorized by type (sag, surge, etc.) and are retained in memory with time, date, amplitude, and duration (if applicable). Up to 10 events per category are recorded in detail. If there are more than 10 events in any one category, the 10 most severe will be maintained. Separate counters indicate total occurrences of each event type. Additionally, the RMU keeps a detailed list of up to 64 of the most recent events, including all categories. The RMU accumulates data until a CLEAR DATA command is given. Front panel LEDs light to indicate disturbance activity. Internal batteries preserve data and time for up to 1 month while being transported or during a power loss.

COPYRIGHT © 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

1.3.1 626-RMU-1 (See Table 1-1 for specifications.)

The 626-RMU-1 (Fig. 1-2) monitors single-phase 50-60 Hz AC power lines, recording changes in RMS level, high frequency impulses, and noise voltage between AC neutral and earth ground. Since it is powered from the system data multibus, an RMU-1 is installed by simply plugging it in and turning it on.

1.3.2 626-RMU-3 and -3H (See Table 1-1 for specifications.)

The 626-RMU-3 and -3H (Fig. 1-3) monitor RMS level changes and impulses for 3-phase 50-60 Hz AC power lines plus a DC channel. Neutral-to-ground monitoring and line synchronization are referenced to phase A. Inputs are connected to screw terminals on a barrier block, with a separate power cord for the unit's supply.

1.3.3 626-RMU-3A and -3AH (See Table 1-1 for specifications.)

The 626-RMU-3A and -3AH are similar to an RMU-3 without a DC channel. Separate input terminals are provided for neutral-to-ground monitoring.

1.3.4 626-PA-6036

The 626-PA-6036 plug-in module provides a communication interface between the RMU and the Series 626 mainframe.

Table 1-1. Specification Summary

NOTE: Impulse accuracies are specified for a half-sine waveshape.

AC VOLTAGE INPUTS:

Range.....	RMU-3 and RMU-3A: 50-320 VRMS, 47-63 Hz RMU-1: 90-130 or 180-250 VRMS, 47-63 Hz RMU-3H and RMU-3AH: 50-600 VRMS, 47-63 Hz
Accuracy.....	±1% reading ±0.5% F.S.
Resolution.....	1 Volt
Input Impedance....	10 Megohms, 100 pF, each terminal to ground for RMU-1, -3, and -3A 20 Megohms , 50 pF each terminal to ground for RMU-3H and -3AH
Common Mode Voltage	Not to exceed 320 VRMS in addition to applied signal for RMU-1, -3, and -3A Not to exceed 600 VRMS in addition to applied signal for RMU-3H and RMU-3AH

COPYRIGHT © 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

Figure 1-2. 626-RMU-1 Front and Rear Views

COPYRIGHT © 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

Figure 1-3. 626-RMU-3 Front and Rear Views

COPYRIGHT © 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

Table 1-1. Specification Summary (Cont'd)

AC CHANNEL IMPULSE RESPONSE:

Range.....	50-2000 VPK, 1-1000 uS for RMU-1, -3, and -3A 100-4000 VPK, 1-1000 uS for RMU-3H and -3AH
Accuracy.....	±10% reading ±1% F.S., 5-50 uS -6dB @ 1uS & 1mS typ.
Resolution	2 Volts for RMU-1, -3, and -3A 4 Volts for RMU-3H and RMU-3AH

NEUTRAL PEAK MEASUREMENT:

Range.....	5-200 VPK, DC-250 KHz
Accuracy.....	±10% reading ±1% F.S., 0-100 KHz -6dB @ 250 KHz typ.
Resolution.....	1 Volt

DC VOLTAGE INPUT (RMU-3 and -3H only):

Range.....	1.0-25.0 VDC for RMU-3 1.0-99.0 VDC for RMU-3H
Accuracy.....	±3% reading ±0.5% F.S.
Resolution.....	0.1 Volt
Input Impedance....	10 Megohms, 100 pF, each terminal to ground for RMU-3 12 Megohms, 100 pF, each terminal to ground for RMU-3H
Common Mode Voltage	Not to exceed 25 VDC in addition to applied signal for RMU-3 Not to exceed 99 VDC in addition to applied signal for RMU-3H

DC CHANNEL IMPULSE (RMU-3 and -3H only):

Range.....	1.0-25.0 VPK, 1-100 uS for RMU-3 only 1.0-99.0 VPK, 1-100 uS for RMU-3H
Accuracy.....	±10% reading ±1% F.S., 5-50 uS -6dB @ 1uS, 1mS typ.
Resolution.....	0.1 Volt

COPYRIGHT © 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

Table 1-1. Specification Summary (Cont'd

POWER SUPPLY:	
Voltage Range.....	95-130 190-250 VAC, switch selectable
Frequency Range....	47-63 Hz
Power Consumption..	20 Watts max.
Fuse Type.....	3/16 A, 250V, Slow Blow
INTERNAL BATTERIES:	
Battery Type.....	Rechargeable N.Cd, not user replaceable
Charge Time.....	2 hrs from complete discharge to full charge. Internal, constant trickle-charge with unit on.
PHYSICAL:	
Size.....	4" (10 cm) high x 11" (28 cm) wide x 8" (20 cm) deep
Weight.....	6 lb (2.7 kg)
ENVIRONMENTAL:	
Temperature.....	+10 to +40 deg. C operating -40 to +55 deg. C storage
Humidity.....	0 to 95% non-condensing

1.4 APPLICATIONS

The RMU provides an efficient and cost effective means of evaluating power system performance at many sites without the need for highly trained personnel. Once the existence of a power problem has been verified with an RMU, a 926 may be used to provide more detail concerning impulse duration and direction as well as other environmental conditions such as temperature and humidity. Some typical applications for the RMU are:

a. To perform pre-installation site surveys. RMUs can be used to determine the adequacy of existing power lines intended to support critical electrical equipment. Anticipation of power problems saves time, money, and future trouble.

b. To determine the effect of power systems operation on equipment malfunction. The time-referenced disturbance record stored in the instrument permits rapid correlation of errors, outages, and equipment damage in computers, industrial process controls, medical monitoring equipment, and so forth, to power line faults.

COPYRIGHT © 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

c. For ongoing maintenance. RMUs are inexpensive enough that they may be permanently installed in computer and industrial control systems. In the case of suspected intermittent power line problems, it would not be necessary to wait for problems to occur before correlations can be made, because the necessary disturbance information would already be stored by the RMU.

RMUs may be pre-programmed and stored at a central location or in field service vehicles and used as needed. Once installed, threshold and event data are secure, since there are no controls to be tampered with. If the unit is turned off, the occasion will be remembered as part of the unit history. (See para. 1.6.) After a monitoring session, the unit may be returned to a central office for data printout and reprogramming. If continuous monitoring of a site is desired, data may be retrieved in the meantime by swapping a freshly programmed unit with one that has been collecting data. Such a swap can be made in seconds with the 626-RMU-1 by simply turning off and unplugging one unit and then plugging in and turning on the fresh unit. Alternately, communication may be established either on-site or via telephone without disconnecting the RMU from the installation. The front panel LED display is also useful in determining the need for a data printout. (See par. 2.1.)

1.5 EVENT RECORDING CAPABILITY

By setting the programmable thresholds, the user defines the ranges over which power line conditions are considered acceptable. For AC voltage, the high and low limits define the normally expected input range. If line voltage leaves this range, a sag, surge, high, or low condition will be recognized. The impulse threshold is the smallest impulse peak which will be considered an event. A similar threshold applies to peak voltages between AC neutral and earth ground, indicating common mode noise. A Power Loss condition will be recorded if the RMU's power supply voltage falls below the minimum operating limit of either 90 or 180 VAC. (See para. 2.2.)

Three levels of detail are used to record events. A count is maintained of the number of events occurring in each category. If an event is among the ten most severe in its category, it will be recorded with time, date, amplitude, and duration (if applicable), and will remain stored in non-volatile memory until another more severe event takes place. If an event of any type is one of the last to have occurred, it will also appear in the sequential event list. Events in the sequential list are recorded with the same detail as for the worst-case events, but the exact order of events as they occur gives a better picture of exactly what happens in a chain of events.

The RMU-3 and -3H maintain 18 separate event categories in which a list of the 10 worst-case events are saved in memory. Including sequential storage, a total of up to 244 event records may be retained. For each of three phases of AC input, there are five categories: Sag, Surge,

COPYRIGHT © 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

High, Low, and Impulse. Other categories include Neutral Peak, DC Average, and DC Impulse events. The RMU-1, -1AW and -1A process a subset of these. The following types of events are recognized by the RMU:

1.5.1 Sag

If line voltage falls below the programmed low limit but returns to normal within 2.55 seconds, a Sag has occurred. Worst-case and sequential Sag events are recorded with time, date, duration with 10mS resolution, and the lowest voltage level reached while out of limits.

1.5.2 Surge

If line voltage exceeds the high limit but returns to normal within 2.55 seconds, a Surge has occurred. Surges are recorded like Sags except that the amplitude represents the highest level reached while out of limits.

1.5.3 Low Line

A low event means that the line has been below the low limit for longer than 2.55 seconds. The event is recorded like a Sag except that duration has 1 second resolution.

1.5.4 High Line

This event is similar to a Low except that the high limit is exceeded. It is recorded like a Surge, but with 1 second resolution for the duration.

1.5.5 Impulse

Any high frequency impulse peak occurring during a cycle will be considered an event unless the amplitude involved is less than the programmed threshold. Worst-case and sequential Impulse events are recorded with time, date, and amplitude. No duration is measured.

1.5.6 Neutral

Neutral events are like Impulse events except that peaks are measured between AC neutral and earth ground rather than differentially. The neutral threshold is used the same way as the impulse threshold.

1.5.7 Power Loss

If the input to the RMU power supply becomes too low to operate the unit, a Power Loss condition results. This causes the unit to save the time and date of the power loss and shut itself off, relying on its

COPYRIGHT © 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

internal batteries to maintain event memory and keep the time clock running. When power returns, the time and date are also recorded. The minimum allowable power supply voltage is determined by the selector switch on the rear panel. (See para. 2.2.) If this switch is set for 115V, a power loss will occur if the supply voltage falls below 90 VAC. For 230V operation, the power loss trip point is 180 VAC.

1.5.8 DC Average (RMU-3 only)

While there are four types of AC voltage level events, only one such category is defined for DC monitoring, simply indicating that the DC input voltage left the normal range. The most severe events are recorded with time and date, duration in seconds, and the most extreme voltage reached while out of limits. In other words, both "High" and "Low" events for DC are combined in the worst-case summary.

1.5.9 DC Impulse (RMU-3 only)

A separate threshold may be programmed for DC Impulse events, which are processed the same as AC Impulse events.

1.5.10 Sequential Events

Every disturbance is entered in the sequential event list in order of occurrence. Up to 64 of the most recent events are saved, including time and date changes. Sequential events are stored with the same detail as worst-case events. In addition, the AC and DC level events are more clearly defined. For example, a complete Sag event in the sequential list will begin with a "LOW" message, along with the time the line first went below the low limit. When the line returns to normal, the Sag event will be completed, as indicated by the printout. High and Low events also begin this way, but end with a "NORMAL" message. The phase letter also appears in sequential printouts, with the letter "D" indicating a DC event.

1.6 UNIT HISTORY

Along with disturbance data, an RMU summarizes activity concerning the unit itself. For example, if new thresholds are set, data is cleared, or the unit is shut off, the time and date of the occurrence are recorded. Up to 32 most recent unit history events are maintained, and cannot be erased by the user. This data is automatically cleared if memory is found to be invalid during a diagnostic test. Table 1-2 describes the various unit history entries.

COPYRIGHT © 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

Table 1-2. RMU Unit History Events

Entry	Meaning
PWR ON	Power was either applied or restored to the unit's power supply.
PWR LOSS	Same as power loss as previously described.
PWR OFF	The ON/OFF switch was used to turn off the RMU
PROGRAM	The programming mode was entered. Thresholds may have been changed.
CLR DATA	All disturbance data has been erased.
TST ERR #	A diagnostic test has failed. The number indicates the failure code. (See para. 3.2.)

1.7 STANDARD ACCESSORIES (SHIPPED WITH ALL UNITS)

Model No.	Part No.	Quan.	Description
626-RMU- (All Models)	TM-111200, Vol 1	1	Operating Manual
	111346-G1	1	Interface Cable
	104943	1	AC line Cord

COPYRIGHT © 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

1.8 OPTIONAL ACCESSORIES

Option	Description
DM-C15	PLUG-IN MODEM CARTRIDGE. May be used with any RMU. Direct-connect, 300 baud, fully duplex, FCC registered. RMU will automatically answer incoming calls. 25 ft. cord for RJ11 jack and manual (TM-111236) included.
P/N 111223	SHIPPING CONTAINER. Rugged, foam-lined briefcase style container. Holds one RMU of any type, cables, option cartridges, manual, and one 626-PA-6036.
Option 101 for 626-PA-6036	OPTIONAL MODEM. Adds telephone modem to 26-PA-6036. Direct-connect, 300 baud, fully duplex, FCC registered. Telephone number is automatically dialed after it is entered from the 626 front panel. All functions of basic 6036 are retained. Use of the interface cable will override the modem. Option must be ordered as part of 6036 and is not field retrofittable. 25 ft. cord for RJ11 jack and manual (TM-111236) included.
TM-111200, Vol. 2	Service (Maintenance) Manual.

1.9 FACTORY REPAIR

WHEN factory repair is desired, proceed as follows:

1. Contact the Dranetz Service Corporation (formerly Dranetz Technologies, Inc., Customer Service Department) in order to obtain an authorization number for factory repair.

   Telephone No: (201) 755-7081

   TWX: (710) 997-9553

   TELEX: 499-7808

   CABLE: DRANETZ

2. Fill out the REPAIR/SERVICE ORDER Form enclosed in the Series 626 Mainframe Operating manual. Ship it along with the malfunctioning equipment to the Dranetz Service Corporation.

COPYRIGHT © 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

SECTION II
OPERATION

2.1 LED DISPLAY

The front panel LED display serves one of two functions, depending on whether or not the LED labelled "UNIT ACTIVE" is lit. If this LED is lit, the other LEDs indicate the amount of disturbance activity while monitoring. The LEDs are arranged in groups of three. Each group corresponds to one of the inputs being monitored. The RMU-1 has two groups, one for line-to-neutral AC voltage and the other for neutral-to-ground peak voltage. The RMU-3A and -3H have an LED group for each of three phases of AC in addition to neutral-to-ground. The RMU-3 and -3H have all the groupings of the RMU-3A plus one for the DC input. The numeric markings next to the LEDs indicate that the total number of events detected for that input falls within a certain range of values. A lit green LED means that between 1 and 9 events have been detected for the grouping as marked. From 10 to 99 events will light a yellow LED, and a red LED means that 100 or more disturbances have been processed. For example, a yellow LED lit in the PHASE A (LINE TO NEUTRAL for the RMU-1) group indicates a total of between 10 and 99 sags, surges, impulses, etc. detected for that phase.

When the RMU is turned on with the ON/OFF switch, the LEDs should flash for several seconds, then go dark. After several more seconds, the "UNIT ACTIVE" LED should light. This means that the RMU is functioning normally. If this LED does not come on, a diagnostic error code will be indicated by the LEDs in the PHASE A or LINE TO NEUTRAL group. The following section describes the meaning of the LEDs in this case.

2.2 POWER SUPPLY

WARNING

The AC outlet used as a source of power for the unit MUST be properly grounded. Connection to an improperly grounded outlet or the use of an adapter preventing proper grounding may present a shock hazard and/or cause damage to the unit and equipment connected to the unit.

The RMU may be operated from either 115 VAC or 230 VAC (nominal). A 115V/230V switch selects the desired line voltage to be used to power the RMU. A 3/16-ampere fuse provides overload protection for either line voltage. An ON/OFF switch controls the application of power to the unit. The voltage selector switch, fuse, ON/OFF switch, and power cord receptacle are all located on the rear panel of the unit.

COPYRIGHT © 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

2.2.1 AC Voltage Selection

When set for 115V nominal power line voltage, the RMU will function over a range of 90-130 VAC. When set for 230V, the allowable range is 180-260 VAC. To select the desired power line voltage, proceed as follows:

a. Turn off the power source being monitored, disconnect all measurement inputs, set the ON/OFF switch to OFF, and disconnect the power cord.

b. Using a small screwdriver or other suitable tool, set the 115V/230V switch to the desired position.

c. For 115V operation, install AC cord P/N 104943 between the unit and the 115V power source. This cord is supplied as a standard accessory to the unit. For 230V operation, AC cord P/N 110726 is recommended.

2.2.2 Replacement of Fuse

If no LEDs light on the front panel when power is applied to the unit, the fuse may need to be replaced. To replace the fuse, proceed as follows.

a. Turn off the power source being monitored, disconnect all measurement inputs, set the ON/OFF switch to OFF, and disconnect the power cord.

b. Using a small screwdriver or other suitable tool, turn the fuse retainer counterclockwise until it and the fuse are ejected from the fuse holder.

c. If the fuse is open, remove it from the retainer, discard it, and insert a replacement fuse in its place.

d. Reinstall by pressing in with the tool and turning clockwise. Use only a 3/16 ampere, 250V slow-blow fuse.

e. If the original fuse was intact, or if the replacement fuse opens, contact the Dranetz Service Corporation to determine if factory repair is needed.

2.3 COMMUNICATING WITH THE RMU

This section explains how to program the RMU and how to access the accumulated disturbance data during or after monitoring. The following discussion assumes the use of a Series 626 as the controlling device. All printout examples are as they would appear from a Series 626 thermal printer. The RMU is not guaranteed to work with devices other than the 626. However, it has been operated successfully with many different

COPYRIGHT © 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

terminals, both CRT and printing type, using the standard interface cable. Information is provided to determine if a particular terminal will operate with the RMU.

2.3.1 Initial Power-up to RMU

Follow the instructions in paragraph 2.2.1 for proper AC voltage selection for the RMU power supply. Make sure the ON/OFF switch is OFF before connecting the power cord between the RMU and the power source outlet. Make sure the outlet is properly grounded. Turn the ON/OFF switch to ON. The LED display should flash as the RMU performs its diagnostic tests. If the LEDs do not flash, leave the unit on for 20-30 seconds, turn the ON/OFF switch OFF for 1 second, then turn it back on again. The LEDs should now flash as expected.

If this is the first time the RMU has been turned on, or if the batteries have been discharged, a diagnostic error is expected. Complete programming of the RMU followed by a diagnostic test will clear the error condition. The RMU should be left on for two days to ensure a full battery charge.

2.3.2 Using the 626-PA-6036 Plug-in Module

To install the 6036 in the Series 626 mainframe, first make sure the 626 is powered off. Slide the circuit board of the plug-in within the card-guide tracks of any module slot until firmly seated. Tighten the top and bottom captive screws to secure the rear panel of the plug-in to the 626 frame.

The 6036 is active only in the 626 PROGRAM mode with the appropriate channel selected. It has no function in the OPERATE mode except to identify itself for summaries and System Check. The plug-in may therefore be left installed in the 626 with no affect on the normal activity of other modules. The 6036 has a 626 module load rating of 1. Refer to the Series 626 Operator's Manual for the maximum allowable module load capacity of the 626 mainframe.

Turn on the 626 and select the PROGRAM mode for the channel in which the 6036 is installed. The RMU should also be turned on. Connect the "D" connector of the interface cable (supplied with the RMU) to the receptacle on the 6036 rear panel and attach the black audio connector to the socket on the rear panel of the RMU. A prompt for baud rate selection will be printed, and one yellow LED on the 626 front panel will light, indicating that a 1-digit entry is expected. Entries of 0, 1, or 2 will select 300, 1200, or 9600 baud, respectively. Other yellow keys will cause a reprint of the baud rate menu, and other color keys and buttons will be ignored. The RMU will identify itself, print the time and date and a program summary, and present a Main Menu of commands. One yellow LED on the 626 front panel will light, indicating that the RMU is ready to accept a command from the Main Menu. If using a device other than the 626 to communicate with the RMU, or if using external modems, continue with the following paragraph. If using a 626 as described above, proceed to paragraph 2.3.4.

COPYRIGHT © 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

2.3.3 RMU Communcation Characteristics

This section completely describes the RMU communication characteristics. The following information is believed to be sufficient to enable a knowledgeable user to determine whether or not the RMU may be operated with a particular terminal device other than a Series 626. The term "terminal" will be used to refer to any terminal, computer, or modem used to communicate with the RMU.

2.3.3.1 Baud Rate Selection

Instead of having a user-selectable switch, the RMU has the ability to adjust itself to one of three baud rates. When the RMU senses that the interface cable has been connected, it uses the first character it receives as its baud rate reference. The RMU will adjust itself for 300, 1200, or 9600 baud, and remain at this rate until either an "end of session" command is received or the interface cable is disconnected. The exact procedure is as follows:

Set the terminal's baud rate to: 300, 1200, or 9600 baud. Connect the interface cable to both the RMU and the terminal. If the RMU is not already powered on, turn it on using the ON/OFF switch on the rear panel and wait for the diagnostic sequence to finish. Type the "@" character and wait for this character to appear on the screen or paper of the terminal. The RMU will adjust its baud rate to match the terminal. When the "@" character appears, press the "RETURN" or "ENTER" key. The RMU will identify itself the same as described when using the 626, and will accept commands from the terminal keyboard. All output from the RMU may be read from the top down as it appears on the terminal screen or paper.

2.3.3.2 Series 626 Keyboard Simulation

The RMU will recognize certain characters from the terminal as equivalent to keys on the Series 626 front panel. Table 2-1 lists the 626 keys used to control the RMU and the corresponding ASCII characters generated by a terminal. The COLON/DECIMAL key on the 626 (marked as:.) is unique in that it is used to represent different characters at different times. When entering a number, it signifies a decimal point. When programming time and date, it is used as a colon and slash, respectively. The 626 always sends a period or decimal point to the RMU whenever this key is pressed. When using a terminal, the RMU may respond to one of several characters when it is expecting the equivalent of the COLON/DECIMAL key from the 626. More detail is provided in the following paragraphs.

COPYRIGHT © 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

Table 2-1. Series 626 Front Panel Keys and ASCII Equivalents.

Series 626 Key	Terminal Character	ASCII (Hex.Byte)
ENTER	RETURN or ENTER	CR (0D)
CLEAR ENTRY	Control-C	ETX (03)
COLON/DECIMAL	colon, period, slash space	: (3A) . (2E) / (2F) SP (20)
0-9	Numerals	0 (30) thru 9 (39)

2.3.3.3 RS-232C Characteristics

The RMU transmits and receives ASCII characters as serial data using RS-232C voltage levels. Characters are transmitted as 8-bit data words with no parity bit. This is equivalent to a 7-bit data word with "space" parity (parity bit always "0"). Two stop bits are transmitted. Received parity is ignored.

The interface socket on the rear panel of the RMU is not the usual 25-pin "D" connector. This helps prevent unwanted tampering. A cable is provided which does include the "D" connector. With this cable, the RMU is configured as DCE (Data Communication Equipment) for use with most data terminals. An adapter may be necessary with some computers and/or modems. Adapters and extension cables may be purchased from a variety of computer supply vendors. Extension cables longer than 50 feet are not recommended. Table 2-2 describes the pinouts of the RMU interface connector and the provided cable. Table 2-3 describes the pinouts at the 626-PA-6036 "D" connector. Unlisted pins are not used.

Table 2-2. RMU Communcation Interface Connections.

Audio Conn. Pin No.	"D" Conn. Pin No.	Description RMU Function
1 --SHIELD--	1,7	RMU case ground
2 --WHITE---	3	Transmit serial data, output from RMU
3 --GREEN---	2	Receive serial data, input to RMU
4 --RED-----5,6,8		Valid CTS, DSR, DCD, output from RMU
5 --BLACK---	20	DTR, input to RMU, must be valid

COPYRIGHT © 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

Table 2-1. 626-PA-4816 Communication Interface Connections

Pin No.	Description
1,7	626 case ground
2	Transmit serial data, output to RMU
3	Receive serial data, input from RMU
4,20	Valid RTS, DTR, output to RMU
8	DCD, must be valid

2.3.3.4 Special Characters

The RMU is usually expecting a numeric digit, a carriage return, or a separator such as ":" or "/". Other characters will terminate the command in progress or repeat a menu prompt. The RMU will echo any character received, except for Control-S. (See para. 2.3.3.5). Normally, all characters output by the RMU are "printable" (letters, numbers, punctuation, etc. plus the carriage return, line feed, and space characters.

2.3.3.5 Pause Control of RMU Output

When sending characters, the RMU ignores all input characters except Control-C and Control-S. If a Control-C is detected, output will stop and a menu prompt will be given. If a Control-S is received, the RMU will echo it and wait for another input character. If the next character received is Control-Q, the RMU will resume its output but will not echo the Control-Q. Any other character will terminate the operation. This is useful with CRT terminals, or when a computer is being used to read characters into a buffer.

If the pause/resume feature is used by a computer, there are several details that should be noted. After the decision has been made by the computer to send a Control-S, it will take time for the character to be sent to the RMU and more time for the RMU to echo. During this time, several other characters may be sent by the RMU. Also, it could be that as the Control-S is received, the RMU has already finished its output sequence and is expecting a valid command, in which case the Control-S would not be echoed. (See para. 2.3.3.4). Therefore, the following guidelines are provided:

1) After a Control-S is sent to the RMU, up to 5 characterss may be transmitted by the RMU before the echo of the Control-S.

COPYRIGHT © 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

2) While waiting for the echo of Control-S, if more than 2 seconds elapses without receiving a character, it should be assumed that the RMU has already finished its operation and is waiting for a command. In this case, the contents of the buffer should be processed as usual, but instead of sending Control-Q, the program should prepare for the next command for the RMU.

2.3.3.6 Using Modems with the RMU

Optional direct-connect modems are available for both the 6036 plug-in and the RMU, providing a complete auto-dial/auto-answer remote communication system. Other modems, both direct-connect and acoustic coupler, have been used with success, although the RMU is not guaranteed to work with other than Dranetz modems. In general, a male-to-male 25-pin "D" adapter is used with the RMU interface cable to convert the RMU from DCE to DTE. The 6036 may be connected to most external modems using a standard male-to-female straight-through cable available from many computer supply vendors. Construction of the male-to-male adapter for the RMU is as follows:

	PIN #..	CONNECT TO..	PIN #	
	1	----------	1	
	2	----------	3	
TO MODEM	3	----------	2	----- RMU CABLE
	4,20	----------	8	
	7	----------	7	
	8	----------	20	

Instructions for the operation of the Dranetz modems are included with the purchase of the modems and are not repeated here. When using other modems, be sure to read the instructions carefully, making sure that all information regarding FCC rules and regulations is completely understood before using the modem.

2.3.4 Main Menu Selections

The Main Menu indicates the choice of functions available to the user. After the menu is printed, the RMU waits for the user to enter a single-digit number corresponding to the desired choice. The letter M will be printed as a record that the following choice will be from the Main Menu. The menu may be reprinted by selecting choice 0. This section describes all Main Menu entries except for 5 and 6, which transfer control to other menus. (See paragraphs 2.3.5 and 2.3.6.) An example from a 626-RMU-3 follows.

COPYRIGHT © 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

NOTE: If you are using a Model 626, read (from the bottom up) the "626" printouts in this manual; if using a Model 626A, read (from the top down) the "626A" printouts instead.

626

```
!  *                          !        ;  Main Menu Prompt
!                             !        ;
!  9 PRESENT VOLTAGE          !        ;
!  8 END SESSIONS             !        ;
!  7 DIAGNOSTIC TEST          !        ;
!  6 DATA MENU                !        ;
!  5 PROGRAM MENU             !        ;
!  4 NEW ID TEXT              !        ;
!  3 NEW ID NUMBER            !        ;
!  2 NEW DATE                 !        ;
!  1 NEW TIME                 !        ;
!  0 REPRINT MENU             !        ;  Main Menu
!                             !        ;
!  DC IMP      5.0V           !        ;
!  DC LO LIM   4.8V           !        ;
!  DC HI LIM   5.2V           !        ;
!  NEUT PEAK    10V           !        ;
!  AC IMP      100V           !        ;
!  AC LO LIM   105V           !        ;
!  AC HI LIM   125V           !        ;  Program summary
!                             !        ;
!  PROGRAM SUMMARY            !        ;
!                             !        ;
!  15:45:03  05/16/93         !        ;  Time and date
!                             !        ;
!       UNIT #1234            !        ;  Unit I.D. number
!  CUSTOMER SURVEY            !        ;  Unit I.D. text
!  REMOTE MONITOR             !        ;
!  DRANETZ 626-RMU-3          !        ;  Three-phase unit
!                             !        ;
!                             !        ;
!  (201) 287-3680             !        ;
!  EDISON,NJ 08818            !        ;
!  DRANETZ TECH., INC         !        ;
!    V1.0  (C)  1983          !        ;
!                             !        ;
!  ************************   !        ;
!                             !        ;
!  ?2                         !        ;  9600 baud selected
!                             !        ;
!  2 = 9600                   !        ;
!  1 = 1200                   !        ;
!  0 = 300                    !        ;
!  SELECT BAUD RATE:          !        ;  Baud rate prompt from 626
```


COPYRIGHT © 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

626A

```
!  SELECT BAUD RATE:      !       ;  Baud rate prompt from 625
!  Ø = 300                !       ;
!  1 = 1200               !       ;
!  2 = 9600               !       ;
!                         !       ;
!   ?2                    !       ;  9600 baud selected
!                         !       ;
!  **********************  !       ;
!                         !       ;
!    V1.Ø  (C)            !       ;
!  DRANETZ TECH., INC     !       ;
!  EDISON,NJ Ø8818        !       ;
!   (2Ø1) 287-3680        !       ;
!                         !       ;
!                         !       ;
!  DRANETZ 626-RMU-3      !       ;  Three-phase unit
!   REMOTE MONITOR        !       ;
!   CUSTOMER SURVEY       !       ;  Unit I.D. text
!       UNIT #1234        !       ;  Unit I.D. number
!                         !       ;
!  15:45:Ø3  Ø5/16/83     !       ;  Time and date
!                         !       ;
!  PROGRAM SUMMARY        !       ;
!                         !       ;
!  AC HI LIM   125V       !       ;  Program summary
!  AC LO LIM   1Ø5V       !       ;
!  AC IMP      1ØØV       !       ;
!  NEUT PEAK    1ØV       !       ;
!  DC HI LIM    5.2V      !       ;
!  DC LO LIM    4.8V      !       ;
!  DC IMP       5.ØV      !       ;
!                         !       ;
!  Ø REPRINT MENU         !       ;  Main menu
!  1 NEW TIME             !       ;
!  2 NEW DATE             !       ;
!  3 NEW ID NUMBER        !       ;
!  4 NEW ID TEXT          !       ;
!  5 PROGRAM MENU         !       ;
!  6 DATA MENU            !       ;
!  7 DIAGNOSTIC TEST      !       ;
!  8 END SESSIONS         !       ;
!  9 PRESENT VOLTAGE      !       ;
!                         !       ;
!  M                      !       ;  Main Menu Prompt
```

COPYRIGHT © 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

2.3.4.1 Setting Time and Date

Choices 1 and 2 allow the RMU's clock to be set to the current time and date. For time, the order of entry is hours, minutes, and seconds in a 24-hour format. Date is entered as month, day, and year. From the 626, the "." key is used as a separator. From a terminal, a colon, period, slash "/" or space may be used. When the entry is complete, the RMU will wait for "ENTER" or "RETURN" before actually setting the clock. Unexpected or aborted entries will return control to the Main Menu without changing the time or date. An example printout follows.

626

```
!                          !       ;
!  M                       !       ;
!                          !       ;
!  14:06:25  04/19/83      !       ;  Present time, new date
!                          !       ;
!                          !       ;
!  ? 04.19.83              !       ;  Date entry (period echoed as
!                          !       ;    separator)
!                          !       ;
!            MM/DD/YY      !       ;  Date entry expected format
!  14:06:03  04/18/83      !       ;  Present time and date
!                          !       ;
!                          !       ;
!2                         !       ;  Menu selection 2, DATE
! M                        !       ;
!                          !       ;
! 14:05:50   04/18/83      !       ;  New time, same date
!                          !       ;
!                          !       ;
! ?  14.05.50              !       ;  Time entry (2:05:50 PM)
!                          !       ;
!  HH:MM:SS                !       ;  Time entry expected format
!  14:01:12  04/18/83      !       ;  Present time and date
!                          !       ;
!1                         !       ;  Menu selection 1, TIME
!  M                       !       ;  Main Menu prompt
!                          !       ;
```


COPYRIGHT © 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

626A

```
!                              !       ;
!  M                           !       ;  Main Menu prompt
!1                             !       ;  Menu selection 1, TIME
!                              !       ;
!  14:01:12  04/18/83          !       ;  Present time and date
!  HH:MM:SS                    !       ;  Time entry expected format
!                              !       ;
!  ?   14.05.50                !       ;  Time entry (2:05:50 PM)
!                              !       ;
!                              !       ;
!  14:05:50  04/18/83          !       ;  New time, same date
!                              !       ;
!  M                           !       ;
!2                             !       ;  Menu selection 2, DATE
!                              !       ;
!                              !       ;
!  14:06:03  04/18/83          !       ;  Present time and date
!            MM/DD/YY          !       ;  Date entry expected format
!                              !       ;
!  ? 04.19.83                  !       ;  Date entry (period echoed
                                          as separator)
!                              !       ;
!                              !       ;
!  14:06:25  04/19/83          !       ;  Present time, new date
!                              !       ;
!  M                           !       ;
!                              !       ;
```

2.3.4.2 Unit Identifier

The RMU may be programmed with a 4-digit unit number and an 18-character identifier. Menu selection 3 is used to program a new unit number:

626

```
! M                            !       ;
!                              !       ;
!       UNIT #0007             !       ;  New number
!  0007                        !       ;  User entry
!       UNIT #0012             !       ;  Present number
!3                             !       ;  Menu selection 3, ID NUMBER
```

626A

```
!3                             !       ;  Menu selection 3, ID NUMBER
!       UNIT #0012             !       ;  Present number
!  0007                        !       ;  User entry
!       UNIT #0007             !       ;  New number
!                              !       ;
! M                            !       ;
```

COPYRIGHT © 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

If a terminal is being used with the RMU, an 18 character text message may be programmed from the keyboard. If a 626 with 6036 plug-in is being used, a terminal must be connected to the 626's RS232 port and the RMU TE ONLY mode must be selected. This is done before interfacing to the RMU so that the terminal keyboard is used rather than the 626 front panel. Example:

626

```
! M                          !       ;
!                            !       ;
! CUST #50133 SURVEY         !       ;  New identifier
! CUST #50133 SURVEY         !       ;  User entry
!  CUSTOMER SURVEY           !       ;  Present identifier
!4                           !       ;  Menu selection 4, ID TEXT
```

626A

```
!4                           !       ;  Menu selection 4, ID TEXT
!  CUSTOMER SURVEY           !       ;  Present identifier
! CUST #50133 SURVEY         !       ;  User entry
! CUST #50133 SURVEY         !       ;  New identifier
!                            !       ;
! M                          !       ;
```

When the choice is made to change either identifier, the RMU erases the existing identifier. Therefore, to eliminate the unit identifier, select Main Menu entries 3 and 4 and follow each selection with CLEAR ENTRY.

2.3.4.3 End of Session

Menu selection 5 has the same effect as removing the interface cable from the RMU, but provides an orderly termination of communication by printing the time and date. A new baud rate may then be selected:

626

```
! 2 = 9600                   !       ;
! 1 = 1200                   !       ;
! 0 = 300                    !       ;
! SELECT BAUD RATE:          !       ;  Baud rate prompt from 6036
!                            !       ;
! ******************         !       ;
! 16:01:22  05/16/83         !       ;  Time and date
!                            !       ;
!   END OF SESSION           !       ;  Message
!                            !       ;
!0                           !       ;
! M                          !       ;
```


COPYRIGHT © 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

626A

```
! M                          !       ;
:8                           !       ;
!                            !       ;
!   END OF SESSION           !       ;  Message
!                            !       ;
! 16:01:22  05/16/83         !       ;  Time and date
! ******************         !       ;
!                            !       ;
! SELECT BAUD RATE:          !       ;  Baud rate prompt from 6036
! 0 = 300                    !       ;
! 1 = 1200                   !       ;
! 2 = 9600                   !       ;
```

2.3.4.4 Present Voltage

Menu selection 9 causes the RMU to print the present voltage at each of its inputs. For the RMU-1, this is the voltage appearing at its power cord. The RMU-3, -3H, -3AH, and RMU-3A print the voltage for each of three phases of AC, plus the present DC level if an RMU-3 or -3H. This feature is useful as a remote check that the monitoring installation is operating or simply as a spot-check of line voltage.

2.3.5 Programming Thresholds

Main Menu selection 5 causes another menu to be printed, showing the various programmable thresholds and their present values. Instead of "M", the letter "P" is used as a prompt. In this mode, selection 0 returns control to the Main Menu, selection 1 reprints the Programming Menu, and selection 2 sets all thresholds to factory preset values. Thresholds are changed by selecting the desired choice and entering a value. When using a Series 626, the front panel LEDs will indicate the number of expected digits and when to press "ENTER". When using a terminal, "ENTER" or "RETURN" is used to complete an entry. Pressing "CLEAR ENTRY" from the 626 or a non-numeric key from a terminal returns control to the Programming Menu without changing thresholds.

The AC thresholds for the RMU-3, -3H, -3AH and the RMU-3A apply to all phases. The RMU-1, -3AH and RMU-3A Programming Menus do not include DC parameters. Table 2-4 summarizes allowable ranges for programmable thresholds and their present values. After programming, it is recommended that event data be cleared and the diagnostic sequence be performed.

COPYRIGHT © 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

626

```
!0                          !       ; Return to Main Menu
! P                         !       ;
!                           !       ;
! AC HI LIM  130            !       ; User enters 130
!3                          !       ; Change AC high limit
! P                         !       ;
!                           !       ;
! AC IMP     0050           !       ; User enters 0050
!5                          !       ; Change AC impulse threshold
! P                         !       ;
!                           !       ;
! 9 DC IMP          5.0V    !       ; DC parameters for
! 8 DC LO LIM       4.8V    !       ; 626-RMU-3 only
! 7 DC HI LIM       5.2V    !       ;
! 6 NEUT PEAK        10V    !       ;
! 5 AC IMP          100V    !       ;
! 4 AC LO LIM       105V    !       ;
! 3 AC HI LIM       125V    !       ; Programming Menu Summary
! 2 PRESET                  !       ;
! 1 REPRINT MENU            !       ;
! 0 RET TO MAIN MENU        !       ;
!5                          !       ; Selection 5, PROGRAM
!M                          !       ; Start from Main Menu
```

626A

```
!M                          !       ; Start from Main Menu
!5                          !       ; Selection 5, PROGRAM
! 0 RET TO MAIN MENU        !       ;
! 1 REPRINT MENU            !       ;
! 2 PRESET                  !       ;
! 3 AC HI LIM       125V    !       ; Programming Menu Summary
! 4 AC LO LIM       105V    !       ;
! 5 AC IMP          100V    !       ;
! 6 NEUT PEAK        10V    !       ;
! 7 DC HI LIM       5.2V    !       ;
! 8 DC LO LIM       4.8V    !       ; 626-RMU-3 only
! 9 DC IMP          5.0V    !       ; DC parameters for
!                           !       ;
! P                         !       ;
!5                          !       ; Change AC impulse threshold
! AC IMP    0050            !       ; User enters 0050
!                           !       ;
! P                         !       ;
!3                          !       ; Change AC high limit
!  AC HI LIM  130           !       ; User enters 130
!                           !       ;
! P                         !       ;
!0                          !       ; Return to Main Menu
```


COPYRIGHT © 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

Table 2-4. Allowable Ranges of Programmable Thresholds.

Parameter	Min	Max (RMU-1,-3,-3A)	Max (RMU-3H,3AH)	Preset
AC HIGH LIMIT	51	320	660*	125
AC LOW LIMIT	50	319	659	105
AC IMPULSE	50	2000	4000	100
NEUTRAL PEAK	005	205	205	010
DC HIGH LIMIT	1.1	25.0	99.0	5.2
DC LOW LIMIT	1.0	24.9	98.9	4.8
DC IMPULSE	1.0	25.0	99.0	5.0

*Even though the AC HIGH LIMITs of the RMU-3H and -3AH are programmable to 660 VRMS, their maximum inputs are 600 VRMS.

2.3.6 Data Printouts

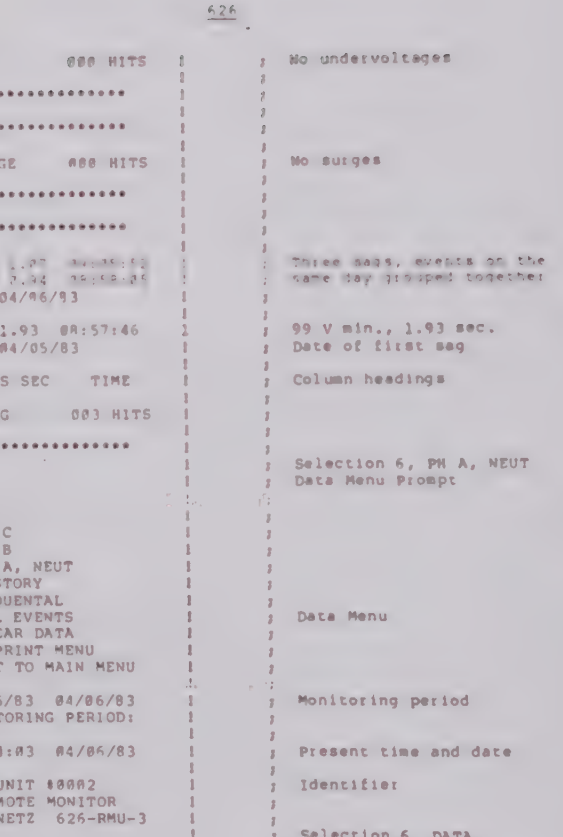
Master Menu selection 6 causes a Data Menu to be printed, with choices allowing stored data to be examined or erased. From this menu, selection 0 returns control to the Master Menu, selection 1 reprints the Data Menu, and selection 2 allows event data to be erased. When this mode is first entered, the unit identifier, time, date, and monitoring period dates are printed. The monitoring period dates are the first and last days of active monitoring. The starting date resets when data is cleared. The ending date is updated daily.

It should be noted that printing of stored data does not remove the data from the RMU. Disturbance data is cleared only by direct command. The CLEAR DATA switch position on the 626 has no affect on the RMUs. Also, communicating with the RMU does not affect its monitoring. The RMU has no separate OPERATE and PROGRAM modes, as it can monitor and respond to commands simultaneously.

Most data processed by the RMU is kept as a list of the ten most severe disturbances in various categories. Each category is identified by phase (if applicable), type of disturbance (sag, etc.), and the number of occurrences of that type of event. Each worst-case event is described on one line, showing amplitude, duration (if applicable), and time of day. Events occurring on the same day are grouped together after the date is printed. The result is two or three columns of data under the headings of VOLTS for amplitude, SEC for duration (if applicable) and TIME for time of day. In the following example, the monitoring period was from April 5 to April 6. The user chose to look at the worst-case summaries for phase A, then the sequential events. After the data printouts, the stored events were erased, preparing the unit for another monitoring session.

COPYRIGHT © 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

626



COPYRIGHT © 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

626

```
!  A HIGH     23:01:21     !        ;  Overvoltage sequence
!                          !        ;
!     253V PK              !        ;
!  A IMP      08:57:48     !        ;  Example of AC impulse event
!                          !        ;
!     99V MIN    1.93S     !        ;  Sag duration < 2.56 seconds
!  A NORMAL   08:57:46     !        ;  Return to normal
!                          !        ;
!  A LOW      08:57:44     !        ;  Sag sequence begins with LOW
!                          !        ;
!  PWR ON     07:32:38     !        ;
!                          !        ;
!  04/05/83                !        ;  First day of monitoring
!                          !        ;
!  SEQUENTIAL EVENTS       !        ;
! ******************       !        ;
!4                          !        ;  Selection 4, SEQUENTIAL
! D                        !        ;
! ******************       !        ;
!                          !        ;
!  NEUTRAL    000 HITS     !        ;  No neutral events
!                          !        ;
!  ******************      !        ;
!                          !        ;
!  ******************      !        ;
!                          !        ;
!  253        08:57:48     !        ;  One impulse event
!      04/05/83            !        ;
!                          !        ;
!  VOLTS          TIME     !        ;
!                          !        ;
!  A IMP       001 HITS    !        ;
!                          !        ;
!  ******************      !        ;
!                          !        ;
!  ******************      !        ;
!                          !        ;
!  132  07  23:01:28       !        ;  One overvoltage event
!      04/05/83            !        ;
!                          !        ;
!  VOLTS SEC      TIME     !        ;
!                          !        ;
!  A HIGH       001 HITS    !        ;
!                          !        ;
!  ******************      !        ;
!                          !        ;
!  ******************      !        ;
```

COPYRIGHT © 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

```
!0                                !       ; Return to master menu
! D                               !       ;
!1                                !       ; User responds "yes"
!                                 !       ; data is now cleared
!                                 !       ;
!                                 !       ;
!   (1=YES 0=NO)                  !       ;
!  ARE YOU SURE?                  !       ; User asked for confirmation
!2                                !       ; Selection 2, CLEAR DATA
!D                                !       ;
!                                 !       ;
!   ••••••••••••••••••            !       ;
!                                 !       ;
!                                 !       ;
!     13.2V PK                    !       ;
!  D IMP      09:14:43            !       ; Example of DC impulse event
!                                 !       ;
!     103V MIN  1.07S             !       ;
!  A NORMAL   09:05:52            !       ;
!                                 !       ;
!  A LOW      09:05:51            !       ; Another sag
!                                 !       ;
!     107V MIN   0.94S            !       ;
!  A NORMAL   08:58:06            !       ;
!                                 !       ;
!  A LOW      08:58:05            !       ; Another sag sequence
!                                 !       ;
!          04/05/83               !       ; Second day of monitoring
!                                 !       ;
!     132V MAX   007S             !       ;
!  A NORMAL   23:01:28            !       ;
```


COPYRIGHT © 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

626A

```
!  M                          !        ;  Master Menu prompt
! 6                           !        ;  Selection 6, DATA
! DRANETZ  626-RMU-3          !        ;
!  REMOTE MONITOR             !        ;
!    UNIT #0002               !        ;  Identifier
!                             !        ;
! 10:14:03  04/06/83          !        ;  Present time and date
!                             !        ;
! MONITORING PERIOD:          !        ;
! 04/05/83  04/06/83          !        ;  Monitoring period
!                             !        ;
! 0 RET TO MAIN MENU          !        ;
! 1 REPRINT MENU              !        ;
! 2 CLEAR DATA                !        ;
! 3 ALL EVENTS                !        ;  Data Menu
! 4 SEQUENTIAL                !        ;
! 5 HISTORY                   !        ;
! 6 PH A, NEUT                !        ;
! 7 PH B                      !        ;
! 8 PH C                      !        ;
! 9 DC                        !        ;
!                             !        ;
! D                           !        ;  Data Menu prompt
!6                            !        ;  Selection 6, PH A, NEUT
! ******************          !        ;
!                             !        ;
!  A SAG       003 HITS       !        ;
!                             !        ;
!  VOLTS SEC     TIME         !        ;  Column headings
!                             !        ;
!       04/05/83              !        ;  Date of first sag
!  99  1.93  08:57:46         !        ;  99 V min., 1.93 sec.
!                             !        ;
!       04/06/83              !        ;
!  107  0.94  08:58:05        !        ;  Three sags, events on the
!  103  1.07  09:05:52        !        ;  same day grouped together
!                             !        ;
! ******************          !        ;
!                             !        ;
! ******************          !        ;
!                             !        ;
! A SURGE      000 HITS       !        ;  No surges
!                             !        ;
! ******************          !        ;
!                             !        ;
! ******************          !        ;
!                             !        ;
! A LOW        000 HITS       !        ;  No undervoltages
```

COPYRIGHT © 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

```
 ••••••••••••••••••
 ••••••••••••••••••
 A HIGH       001 HITS
 VOLTS SEC     TIME
      04/05/83
 232  07  23:01:20          One overvoltage event
 ••••••••••••••••••
 ••••••••••••••••••
  A IMP       001 HITS
  VOLTS         TIME
      04/05/83
 253          08:57:48      One impulse event
 ••••••••••••••••••
 ••••••••••••••••••
  NEUTRAL     000 HITS       No neutral events
 ••••••••••••••••••
 D
4                           Selection 4, SEQUENTIAL
 ••••••••••••••••••
  SEQUENTIAL EVENTS
        04/05/83            First day of monitoring
  PWR ON      07:32:38
  A LOW       08:57:44      Sag sequence begins with LOW
  A NORMAL    08:57:46      Return to normal
    99V MIN    1.93S        Sag duration < 2.56 seconds
  A IMP       08:57:48      Example of AC impulse event
        253V PK
  A HIGH      23:01:21      Overvoltage sequence
  A NORMAL    23:10:28
       132V MAX  007S
        04/06/83            Second day of monitoring
```


COPYRIGHT © 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

```
!  A LOW       08:58:05   !        ;  Another sag sequence
!                         !        ;
!  A NORMAL    08:58:06   !        ;
!     107V MIN  0.94S     !        ;
!                         !        ;
!  A LOW       09:05:51   !        ;  Another sag
!                         !        ;
!  A NORMAL    09:05:52   !        ;
!    103V MIN  1.07S      !        ;
!                         !        ;
!  D IMP       09:14:43   !        ;  Example of DC impulse event
!    13.2V  PK            !        ;
!                         !        ;
!                         !        ;
! ******************      !        ;
!                         !        ;
!D                        !        ;
!2                        !        ;  Selection 2, CLEAR DATA
!  ARE YOU SURE?          !        ;  User asked for confirmation
!  (1=YES 0=NO)           !        ;
!                         !        ;
!                         !        ;
!    ?                    !        ;  User responds "yes",
!1                        !        ;  data is now cleared.
! D                       !        ;
!0                        !        ;  Return to master menu
```

2.4 CONNECTION OF MONITORED INPUTS

Input connections and disconnections should be made only when the Remote Monitor ON/OFF switch is OFF. For the RMU-1, simply plug the unit's power cord into the outlet to be monitored and turn on the Remote Monitor. Refer to figure 2-1 for three-phase input connections. Note that for a "delta" configuration there is no neutral as such, so the neutral threshold should be set to 205V to avoid unwanted data printouts. Also, be sure to replace the barrier block protective cover before energizing the input signals.

All units will, as mentioned, record a power loss if the power supply voltage falls below either 90 or 180 VAC, depending on the position of the selector switch on the rear panel. The RMU-3, -3H, -3AH and RMU-3A will sample inputs at a 50 Hz rate if the AC on phase A should drop out, ensuring continuous monitoring of impulses, neutral-to-ground, etc.

COPYRIGHT © 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

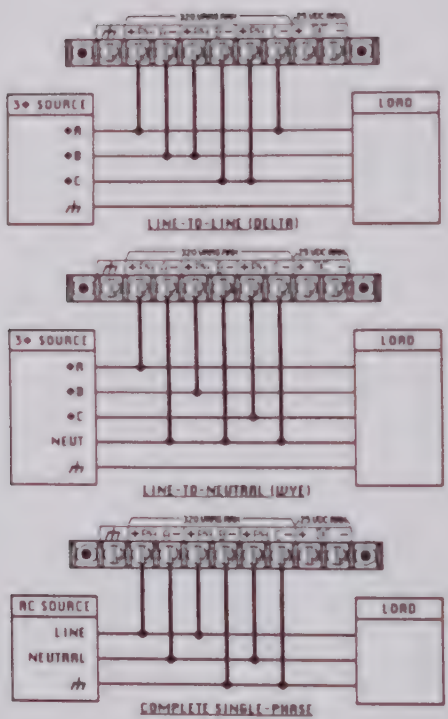


Figure 2-1. 626-RMU-3 and -3H AC Input Connections

COPYRIGHT © 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

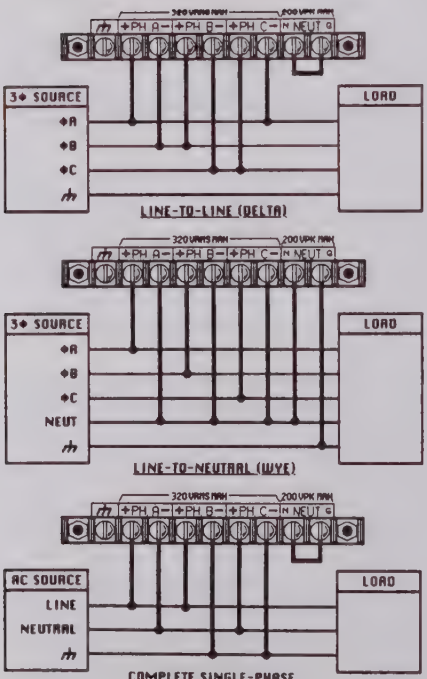


Figure 2-2. 626-RMU-3A and -3AH AC Input Connections

COPYRIGHT © 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

2.5 INTERNAL BATTERIES

The RMU is equipped with internal batteries to maintain data and keep the time clock running while turned off or during a power loss. As long as the RMU is powered on, the batteries are being trickle-charged. Fully charged batteries will maintain data and time for one month, typically. If the batteries become severely depleted, as evidenced by diagnostic errors (see para. 3.2), the unit should be left on for two days to ensure a full charge.

The batteries are permanently installed in the RMU and cannot be accessed by the user. Replacement may be necessary after 2 to 3 years of operation. If it seems that the batteries are not holding a charge, the unit should be returned to the factory.

COPYRIGHT © 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

SECTION III
OPERATIONAL TESTS

3.1 GENERAL

This section provides information for performing operational tests to verify that the RMU is operating properly.

3.2 DIAGNOSTICS

When power is applied or restored to the RMU, or upon user command, various tests are performed by the unit to check hardware and data integrity. The front panel LEDs are cycled to make sure they all light. Read/write memory (RAM) is tested for proper operation, and battery powered RAM is checked for expected data patterns. The time update interval is verified, and time and date data are checked for validity. The analog-to-digital converter is tested for specified conversion time. User-programmed thresholds are compared against the minimum and maximum allowable values.

If a test is failed, the "Unit Active" LED will be off and a code will be indicated by the PHASE A (RMU-3, -3H, -3AH, and RMU-3A) or LINE TO NEUTRAL (RMU-1) group of LEDs. If the diagnostic routine was user-initiated, a printed response will reflect the code shown by the LEDs. If there were no failures, the user-initiated response will be "DIAGNOSTIC CODE 0", and the LEDs will resume their normal function with the "Unit Active" LED lit. In the case of multiple failures, the LEDs and the printed response, if any, will indicate the last failure encountered. All failures are retained as part of unit history. Table 3-1 describes the failure codes and possible remedies. If a hardware failure is indicated, refer to paragraph 1.9 for factory repair instructions. Any diagnostic failure inhibits monitoring activity, causing the RMU to wait until the problem is resolved. When used as recommended, no failures are, of course, anticipated. If the batteries become discharged, however, the unit will fail to find expected data in memory, and time, date, threshold, and unit identifier will all be invalid. Unit history will be cleared. Recovery from this situation involves reprogramming the invalid parameters and clearing the event data.

COPYRIGHT © 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

Table 3-1. Diagnostic Codes.

Code Number	LEDs GRN	YEL	RED	Description
1	OFF	OFF	ON	(Not used)
2	OFF	ON	OFF	Expected data not found. Possible discharged battery, confirmed by error numbers 4 and 7. Reprogram all parameters and clear event data.
3	OFF	ON	ON	RAM test failure. Bad memory and/or clock ICs.
4	ON	OFF	OFF	Time and/or date invalid. Reprogram.
5	ON	OFF	ON	Wrong time update interval. Program time and retest. Bad clock IC if second failure.
6	ON	ON	OFF	A/D convertor did not respond as expected. Bad IC.
7	ON	ON	ON	Invalid threshold data. Reprogram.

COPYRIGHT © 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

WARNING

Because of possible shock or fire hazards, connection of this instrument should be performed in compliance with the National Electrical Code (ANSI C1) and/or any other requirements which may be applicable to the user.

Installation, operation, and maintenance should be performed only by qualified personnel.

TM-111236

VOLUME 1

OPTIONAL MODEMS

FOR

REMOTE MONITOR UNITS
626-RMU-1 626-RMU-3 626-RMU-3A
626-RMU-3H 626-RMU-3AH

AND

REMOTE MONITOR INTERFACE ADAPTER
626-PA-6036

Note: Refer to Volume 2 of TM-111200 for maintenance information.

1 May 1984
(Rev. 1 July 1984)
(Rev. 15 June 1985)
(Rev. 1 Sept. 1985)
(Rev. 1 July 1986)
(Rev. 15 Dec. 1986)

© COPYRIGHT 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. EDISON, NEW JERSEY.
ALL RIGHTS RESERVED.

DRANETZ
DRANETZ TECHNOLOGIES, INCORPORATED
1000 New Durham Rd., PO Box 4019, Edison, NJ 08818-4019

NOTICE REGARDING DRANETZ' PROPRIETARY RIGHTS

This publication contains information proprietary to Dranetz Technologies, Inc. By accepting and using this manual, the user agrees that the information contained herein will be used solely for the purpose of repairing or operating equipment of Dranetz Technologies, Inc. These manuals are to be returned to Dranetz Technologies, Inc. when no longer required by the user, or when there is a change in ownership of the equipment.

These publications are protected under the Copyright laws of the United States Title 17 et seq. No part of this publication may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language or computer language, in any form, by any means, electronic, mechanical, magnetic, optical, chemical, manual, or otherwise, without the expressed written consent of Dranetz Technologies, Incorporated, 1000 New Durham Road, PO Box 4019, Edison, New Jersey 08818-4019.

TABLE OF CONTENTS

OPTIONAL MODEMS FOR REMOTE MONITOR UNITS
626-RMU-1 626-RMU-3 626-RMU-3A
626-RMU-3H 626-RMU-3AH
AND
626-PA-6036 REMOTE MONITOR INTERFACE ADAPTER

Section		Page
I	GENERAL INFORMATION	
1.1	Introduction	1-1
1.2	Compliance with FCC Rules and Regulations.	1-1
1.2.1	Notification of the Telephone Company. .	1-1
1.2.2	Connection to the Telephone Network. . .	1-1
1.2.3	Responsibilities of the Telephone Company.	1-2
1.2.4	In Case of Trouble	1-2
1.2.5	Incidence of Harm.	1-2
1.2.6	Service.	1-2
1.3	Factory Repair	1-2
II	THE DM-C15 MODEM CARTRIDGE	
2.1	Description.	2-1
2.2	Installation of the DM-C15 in the RMU. . . .	2-1
2.3	Connection to the Telephone Line	2-1
2.4	Characteristics of the RMU with the DM-C15 Installed	2-1
III	OPTION 101 FOR THE 626-PA-6036	
3.1	Description.	3-1
3.2	Connection to the Telephone Line	3-1
3.3	Characteristics of the 6036 with Option 101.	3-1
IV	OPERATION	
4.1	Establishing Telephone Communication	4-1
4.1.1	Using the 6036 with Option 101	4-1
4.1.2	Using Other Modems to Communicate with the RMU.	4-1
4.2	Terminating the Telephone Connection	4-2
4.3	Specification Summary.	4-4

COPYRIGHT © 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

STATEMENT OF WARRANTY

ALL PRODUCTS OF DRANETZ TECHNOLOGIES, INC. ARE WARRANTED TO THE ORIGINAL PURCHASER AGAINST DEFECTIVE MATERIAL AND WORKMANSHIP FOR A PERIOD OF ONE YEAR FROM THE DATE OF DELIVERY. DRANETZ WILL REPAIR OR REPLACE, AT ITS OPTION, ALL DEFECTIVE EQUIPMENT RETURNED, FREIGHT PREPAID, DURING THE WARRANTY PERIOD, WITHOUT CHARGE FOR REPAIR, PROVIDED THERE IS NO EVIDENCE THAT THE EQUIPMENT HAS BEEN MISHANDLED OR ABUSED. THIS WARRANTY SHALL NOT APPLY TO ANY DEFECTS RESULTING FROM IMPROPER OR INADEQUATE MAINTENANCE, BUYER-SUPPLIED HARDWARE SOFTWARE OR INTERFACING, UNAUTHORIZED MODIFICATION OR MISUSE OF THE EQUIPMENT, OPERATION OUTSIDE OF THE ENVIRONMENTAL SPECIFICATIONS FOR THE PRODUCT, OR IMPROPER SITE PREPARATION OR MAINTENANCE.

The information in this manual has been reviewed and is believed to be entirely reliable. No responsibility, however, is assumed for any inaccuracies. The material in this manual is for information purposes only, and is subject to change without notice.

VOLUME 1
OPERATOR'S MANUAL

OPTIONAL MODEMS FOR REMOTE MONOITOR UNITS
626-RMU-1 626-RMU-3 626-RMU-3A
AND 626-PA-6036 REMOTE MONITOR INTERFACE ADAPTER

SECTION 1
GENERAL INFORMATION

1.1 INTRODUCTION

This manual describes the installation and operation of the optional modems available for the 626-RMU Remote Monitors and the 626-PA-6036 Remote Monitor Interface Adapter plug-in. This material is provided as an addition to that contained in TM-111200 Volume 1. Use of the modems described below will have no affect on the operating characteristics or specifications as outlined in TM-111200, except for the initiation and termination of communication between the 626-RMU and the 626-PA-6036.

1.2 COMPLIANCE WITH FCC RULES AND REGULATIONS

The modems described in this manual have been approved by the FCC (Federal Communications Commission) for direct connection to the Public Switched Telephone Network. To comply with FCC regulations, users must be aware of certain procedures and considerations regarding the installation and operation of registered terminal equipment.

1.2.1 Notification of the Telephone Company

Before connection to the telephone network, the telephone company must be told which particular line is to be used, the FCC Registration number and Ringer Equivalence of the modem, and which jack is required for the connection. This information appears on the labels supplied with the modem. The telephone company must be notified upon final disconnection of the equipment.

FCC Registration number: DRJ6YR-70737-DM-N
Ringer Equivalence: 0.3B
Phone Jack (USOC): RJ11

1.2.2 Connection to the Telephone Network

All direct connection to the telephone network must be made through standard plugs and jacks as described in Part 68, Subpart F of the FCC Rules. Connection to party lines and coin telephone service is prohibited. After the telephone company is properly notified of the intended connection and the required jack is installed, the modem may be connected by inserting the mating plug of the cable into the jack.

COPYRIGHT © 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

1.2.3 Responsibilities of the Telephone Company

Technical information needed to permit compatibility with telephone company facilities shall be provided by the telephone company, upon request. In order to afford the customer the opportunity to maintain uninterrupted service, the telephone company shall give adequate notice of changes in facilities and operations which could affect the use or performance of the customer's equipment.

1.2.4 In Case of Trouble

If trouble is experienced, the modem must be disconnected from the telephone line to determine if the equipment is malfunctioning. Use of the modem shall be discontinued until the problem is solved.

1.2.5 Incidence of Harm

If the modem should cause harm to the telephone network, the telephone company shall, if practicable, notify the customer that service may be temporarily discontinued. If it becomes necessary to discontinue service immediately without prior notice, the telephone company shall promptly notify the customer, give the customer an opportunity to correct the harmful situation, and inform the customer of the right to bring a complaint to the Commission, FCC, pursuant to the procedures set forth in Part 68, Subpart E of the FCC Rules.

1.2.6 Service

All service and repairs must be performed by Dranetz Technologies, Inc. If unauthorized modification or repair is performed, both the FCC registration and manufacturer's warranty in effect will be null and void. If a malfunction is suspected, it is the user's responsibility to contact Dranetz Technologies, Inc. for instructions.

1.3 FACTORY REPAIR

When factory repair is required, proceed as follows:

1. Contact the Dranetz Service Corporation (formerly Dranetz Technologies, Inc., Customer Service Department in order to obtain an Authorization Number for factory repair.

   Telephone Number: (201) 755-7881

   TWX: (710) 997-9553

   Telex: 499-7808

   Cable: DRANETZ

2. Fill out the REPAIR/SERVICE ORDER form enclosed in the Series 626 Mainframe Operating Manual. Ship it along with the malfunctioning equipment to the Dranetz Service Corporation.

COPYRIGHT © 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

SECTION II
THE DM-C15 MODEM CARTRIDGE

2.1 DESCRIPTION

The DM-C15 is a Bell 103 compatible, 300 baud, direct-connect modem in a small plastic cartridge with a 25 ft. telephone cord permanently attached. The modem may be used with any RMU for data communication over standard voice-grade telephone lines. With the DM-C15, the RMU will automatically answer an incoming call, allowing completely unattended remote operation.

2.2 INSTALLATION OF THE DM-C15 IN THE RMU

CAUTION

Insertion or removal of the DM-C15 cartridge while the RMU is powered on may cause damage to both pieces of equipment.

To install the DM-C15 modem cartridge in an RMU, proceed as follows:

1) Turn the ON/OFF switch on the RMU rear panel to "OFF"

2) Insert the DM-C15 into the cartridge receptacle on the RMU rear panel. When fully inserted, the cartridge will protrude slightly less than 1 inch from the panel.

3) Turn the ON/OFF switch on the RMU rear panel to "ON".

To remove the DM-C15 from the RMU, reverse the above procedure.

2.3 CONNECTION TO THE TELEPHONE LINE

Refer to paragraph 1.2.2 of this manual for this information.

2.4 CHARACTERISTICS OF THE RMU WITH THE DM-C15 INSTALLED

With the DM-C15 modem cartridge, the RMU has two communication interfaces: its standard serial port and a telephone modem. One or the other may be used at any one time. The serial port has priority in that the RMU will not answer a telephone call if an active interface cable is detected. However, connecting an interface cable to the serial port will not interrupt a telephone connection. The serial port is used as described in TM-111200.

When the RMU detects an incoming call, it will wait for ringing to stop and place the modem off hook. No tone will be transmitted for 2 seconds (meeting the FCC requirements). After the billing delay, the RMU will transmit the Bell 103 Mark tone for an Answer modem (2225 Hz). The RMU will wait 15 seconds for the Originate Mark tone (1270 Hz). If this tone is not detected, the RMU will place the modem on hook, terminating the connection.

COPYRIGHT © 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

SECTION III
OPTION 101 FOR THE 626-PA-6036

3.1 DESCRIPTION

Option 101 for the 626-PA-6036 is a built-in Bell 103 compatible, 300 baud, direct-connect modem, allowing data communication with an RMU using standard voice-grade telephone lines. With this option, a telephone jack and an LED indicator are located on the 6036 rear panel along with the standard RS-232C connector. A 25 ft. telephone cord is included. Installation of the plug-in into the Series 626 mainframe is described in TM-111200 Volume 1. This option must be ordered with the 6036 and is not retrofittable.

3.2 CONNECTION TO THE TELEPHONE LINE

Insert the plug at one end of the 25 ft. cord into the telephone jack on the 6036 rear panel. Refer to paragraph 1.2.2 of this manual regarding connection to the telephone network.

3.3 CHARACTERISTICS OF THE 6036 WITH OPTION 101

With Option 101, the 6036 has two communication interfaces: its standard serial port and a telephone modem. One or the other may be used at any one time. The serial port has priority in that the 6036 will not initiate a telephone connection if an active interface cable is detected. Connection of an interface cable will not interrupt an established telephone connection. The serial port is used as described in Volume 1 of TM-111200.

The LED on the 6036 rear panel, marked "OFF HOOK" will light while the modem is "off hook" (corresponding to a telephone with its handset lifted from the switch hook). This condition occurs while dialing and during a telephone connection. Any other time, such as while using the 6036 RS-232 port or while the 626 OPERATE mode is in effect, the modem will be "on hook" (disconnected).

COPYRIGHT © 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

SECTION IV
OPERATION

4.1 ESTABLISHING TELEPHONE COMMUNICATION

The following descriptions assume that an RMU with a DM-C15 modem is installed where it is connected to a telephone line, ready to answer an incoming call.

4.1.1 Using the 6036 with Option 101

With the Series 626 powered on, in the OPERATE mode, select the PROGRAM mode for the 6036 with Option 101. The 6036 will identify itself and indicate that it has the "MODEM OPTION". If an active interface cable has been connected to the 6036 RS-232 port, the usual baud rate prompt will be printed. Otherwise, the user will be prompted to enter a telephone number, and to press the ENTER key after all digits have been input. The number may be up to 18 digits long. The COLON/DECIMAL key is used as a "wait for second dial tone" and is useful when calling from a system where a special code must be dialed to obtain an outside line. The CLEAR ENTRY key is used to abort the entry and start over.

After the telephone number has been entered, the 6036 will print the number. If the user decides not to dial the number, the CLEAR ENTRY key may be pressed. If the ENTER key is pressed, the 6036 will wait 2 seconds for a dial tone and then dial the number. Pulse dialing is used, so the time required to dial the number may be as long as 20 seconds, depending on the length of the number and the value of the digits.

After dialing the number, the 6036 will transmit a 1270 Hz tone (Originate Mark) and wait 12 seconds for a 2225 Hz tone (Answer Mark) from the RMU. If the tone is not detected, the 6036 will place its modem on hook and indicate that the call was not completed. If the tone is found, the 6036 will proceed to send characters as if the RS-232 port were being used. From this point, operation of the RMU is exactly as described in TM-111200.

If there is no response from the RMU within 30 seconds after dialing is started, pressing the CLEAR ENTRY key will cause the 6036 to repeat the character sequence sent to the RMU. If there is still no response after several seconds, the Series 626 should be set to the OPERATE mode, and then back to the PROGRAM mode to start over.

4.1.2 Using other Modems to Communicate with the RMU

The RMU with the DM-C15 behaves as a Bell 103 compatible Auto-Answer modem. Any modem used to communicate with the RMU/DM-C15 must be Bell 103 compatible, Originate mode, full duplex, and transmit and receive serial asychronous binary data at 300 baud. Specific instructions cannot be given, but successful operation has been achieved with various acoustic coupler, outboard direct-connect, and built-in computer modems.

COPYRIGHT © 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

4.2 TERMINATING THE TELEPHONE CONNECTION

The normal method of terminating the telephone connection is to use the AMI's PAR (BREAK) command. This is AMI Mark protocol number 9. When this command is made, the AMI sends a message to the host to place its modem on-hook, then the AMI places its own modem on-hook. Turning the modem off at the CORRECT time will also cause the other to go on-hook. Both modems will automatically go on-hook if they fail to detect the proper carrier tones. The host will produce the message "DATA CARRIER LOST" if this happens.

4.3 SPECIFICATION SUMMARY

	[illegible]	[illegible]
Modem Type	Bell 103, Answer	Bell 103, Originate
Telephone Connection	Direct-connect	Direct-connect
FCC Reg. No.	[illegible]	[illegible]
Ringer Equivalence	0.3B	0.3B
Jack Type [illegible]	RJ..	RJ..
Data Format	Serial, Asynchronous	Serial, Asynchronous
Data Rate	300 Baud	300 Baud
Operating Mode	Full Duplex	Full Duplex
Transmit Level	-9 dBm Permissive	-9 dBm Permissive
Transmit Mark Tone	2225 Hz	1270 Hz
Transmit Space Tone	2025 Hz	1070 Hz
Receive Mark Tone	1270 Hz	2225 Hz
Receive Space Tone	1070 Hz	2025 Hz
Pulse Dialing	N/A	61 mS Make 39 mS Break 800 mS Between Digits

COPYRIGHT © 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

CALLING SEQUENCE:

1) User enters telephone number from Series 626 front panel, then presses ENTER to start dialing.

2) 6036 waits 2 seconds, dials number, transmits 1270 Hz tone, and waits for 2225 Hz. If tone is not received within 12 seconds, 6036 goes on hook and prints "CALL NOT COMPLETED"

3) RMU detects ringing, goes off hook, waits 2 seconds, transmits 2225 Hz tone, and waits for 1270 Hz tone. If no received tone within 15 seconds, RMU goes on hook.

4) If 6036 detects 2225 Hz tone from RMU, it attempts to send a character sequence. CLEAR ENTRY key repeats character sequence attempt. If no response from RMU within 30 seconds, user sets Series 626 to OPERATE mode, causing 6036 modem to go on hook.

5) If RMU responds, operation is as described in TM-111200.

6) User selects END SESSION command to terminate connection.

COPYRIGHT © 1984, 1985, 1986
BY DRANETZ TECHNOLOGIES, INC. ALL RIGHTS RESERVED.

WARNING

Because of possible shock or fire hazards, connection of this instrument should be performed in compliance with the National Electric Code (ANSI C1) or any other requirements, or both, which may be applicable to the user.

Installation, operation, and maintenance should only be performed by qualified personnel.

TM-113000-G1

VOLUME 1 -- OPERATOR'S MANUAL

MODEL 626GP

GRAPHICS PRINTER FOR THE SERIES 626

1 May 1986

See opposite side relative to proprietary rights.

Note: Refer to Volume 2 (Service Manual) of TM-113000-G1 for the maintenance information.

© Copyright 1986
Dranetz Technologies, Inc.
All Rights Reserved.

DRANETZ

DRANETZ TECHNOLOGIES, INC.
1000 New Durham Rd., PO Box 4019
Edison, New Jersey 08818-4019

NOTICE REGARDING DRANETZ PROPRIETARY RIGHTS

This publication contains information proprietary to Dranetz Technologies, Inc. By accepting and using this manual, the user agrees that the information contained herein will be used solely for the purpose of repairing or operating equipment of Dranetz Technologies, Inc. These manuals are to be returned to Dranetz Technologies, Inc. when no longer required by the user, or when there is a change in ownership of the equipment.

These publications are protected under the Copyright laws of the United States Title 17 et seq. No part of this publication may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language or computer language, in any form, by any means, electronic, mechanical, magnetic, optical, chemical, manual, or otherwise, without the prior written permission of Dranetz Technologies, Inc., 1000 New Durham Road, PO Box 4019, Edison, New Jersey 08818-4019.

Table of Contents (Page 1 of 2)

Section		Page
I	**GENERAL INFORMATION**	1-1
	Subsection	
	1.1 SCOPE	1-1
	1.2 INTRODUCTION	1-1
	1.3 APPLICATION AND PURPOSE	1-1
	1.4 PHYSICAL DESCRIPTION	1-1
	1.5 TECHNICAL SPECIFICATIONS	1-2
	1.6 GENERAL OPERATIONAL DESCRIPTION	1-3
	1.6.1 Printing Capabilities	1-3
	1.6.2 Connections	1-3
	1.6.2.1 Graphics Printer-to-Mainframe	1-3
	1.6.2.2 Graphics Printer-to-Remote Device	1-3
	1.6.2.3 Power Cord Connection	1-4
	1.6.3 Switches and LED Indicators	1-4
	1.7 STANDARD ACCESSORIES	1-4
	1.7.1 Reordering Thermal Paper	1-6
	1.8 OPTIONAL ACCESSORIES	1-6
	1.9 FACTORY REPAIR	1-6
II	**INSTALLATION AND OPERATION**	2-1
	Subsection	
	2.1 GENERAL	2-1
	2.2 INSTALLATION	2-1
	2.2.1 Installation of Thermal Paper	2-1
	2.3 OPERATION	2-2
	2.3.1 Sample Printout	2-3
	2.3.2 In Case of Power Outage	2-3
III	**OPERATIONAL TEST**	3-1
	Subsection	
	3.1 GENERAL	3-1

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

Table of Contents (Page 2 of 2)

List of Tables

Table		Page
1-1	Technical Specifications	1-2

List of Illustrations

Figure		Page
1-	[illegible]	1-
1-2	Graphics Printer-to-Mainframe	1-
1-3	Graphics Printer-to-Remote Device	1-
1-4	Typical Front (Top) Panel	1-
2-1	Sample Graphics Printer Display	2-

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

STATEMENT OF WARRANTY

ALL PRODUCTS OF DRANETZ TECHNOLOGIES, INC. ARE WARRANTED TO THE ORIGINAL PURCHASER AGAINST DEFECTIVE MATERIAL AND WORKMANSHIP FOR A PERIOD OF ONE YEAR FROM THE DATE OF DELIVERY. DRANETZ WILL REPAIR OR REPLACE, AT ITS OPTION, ALL DEFECTIVE EQUIPMENT RETURNED, FREIGHT PREPAID, DURING THE WARRANTY PERIOD, WITHOUT CHARGE FOR REPAIR, PROVIDED THERE IS NO EVIDENCE THAT THE EQUIPMENT HAS BEEN MISHANDLED OR ABUSED. THIS WARRANTY SHALL NOT APPLY TO ANY DEFECTS RESULTING FROM IMPROPER OR INADEQUATE MAINTENANCE, BUYER-SUPPLIED HARDWARE/SOFTWARE OR INTERFACING, UNAUTHORIZED MODIFICATION OR MISUSE OF THE EQUIPMENT, OPERATION OUTSIDE OF THE ENVIRONMENTAL SPECIFICATIONS FOR THE PRODUCT, OR IMPROPER SITE PREPARATION OR MAINTENANCE.

The information in this manual has been reviewed and is believed to be entirely reliable. No responsibility, however, is assumed for any inaccuracies. The material in this manual is for information purposes only, and is subject to change without notice.

Figure 1-1. Series 626 Mainframe with Graphics Printer

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

VOLUME 1
OPERATOR'S MANUAL

MODEL 626GP GRAPHICS PRINTER FOR THE SERIES 626

SECTION I
GENERAL INFORMATION

1.1 SCOPE

The manual for this product consists of two volumes. Volume 1, the Operator's manual, is divided into three sections: (I) GENERAL INFORMATION, (II) INSTALLATION AND OPERATION, and (III) OPERATIONAL TEST. Volume 2, the Service manual, contains the maintenance instructions and consists of four sections, IV through VII. (See Volume 2 for a description of these sections.)

1.2 INTRODUCTION

Volume 1 of this manual provides Operator's instructions for the Model 626GP Graphics Printer. (It will also be referred to in this manual as simply the "Graphics Printer.")

The Graphics Printer is designed for use with any Series 626 plug-in whose output can be graphically displayed.

1.3 APPLICATION AND PURPOSE

The Graphics Printer is a thermal printer designed for printing alphanumeric text and graphics data for applicable Series 626 plug-ins. The printer receives graphics and text information from a plug-in and then prints the graph. This graphic presentation of data is often easier to understand and to use when explaining environmental disturbances.

1.4 PHYSICAL DESCRIPTION

(See Figure 1-1 on the facing page for a Graphics Printer sitting on top of a Series 626 Mainframe.)

The Graphics Printer is specially encased in a modified Series 626 Mainframe cover for ease of transport and storage. The printer's J2 connector attaches to connector J2 on the rear panel of the Mainframe via an interface cable. The Graphics Printer can also be connected to an RS-232C compatible remote CRT terminal or teletypewriter during Series 626 remote control. This is done using an optional interface cable connected between the printer's J1 connector and remote device. The Graphics Printer is equipped with an internal Uninterruptable Power Supply (UPS) allowing it to operate for at least 10 minutes during a power outage.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

1.5 TECHNICAL SPECIFICATIONS

The technical specifications for the Graphics Printer are listed in Table 1-1 below.

Table 1-1. Technical Specifications

PRINTER
A. Type: Thermal Printer
B. Direction: Unidirectional Logic Seek, Text & Graphics
C. Dots per line: 320
D. Character Format: 5-by-7 in a 7-by-8 Cell
E. Dot Size: 0.211-by-0.26 mm (Height-by-Width)
F. Printing Width: 89.6 mm
G. Thermal Paper Width: 112 mm Thermal Paper Thickness: 66 um
H. Environmental Specifications: Operating Temp: +10° to +40°C (50° to +104°F) Storage Temp: -40° to +60°C (-4° to +140°F) Humidity: 10% to 90% (non-condensing)
I. Power Requirements: 90 to 130 V rms at 47-450 Hz, 15W nom., 1/2A
J. Dimensions (approx.): 11 1/2" wide by 7 1/2" deep by 3" high (292 by 190 by 76 mm)
K. Weight (approx.): 4 lbs (1.8 kgs)
PRINTER COMMUNICATIONS PORT (J2)
A. Type: RS-232C Compatible (DTE Connector, J2)
B. Connection: To the Series 626 Mainframe's Communications Port (DCE Connector, J2) via an Interface Cable
C. Baud Rate: 1200
PRINTER REMOTE COMMUNICATIONS PORT (J1)
A. Type: RS-232C Compatible (DCE Connector, J1)
B. Connection: To a Remote Device's Communications Port (DTE connector) via an Interface Cable
C. Baud Rate: 1200

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

1.6 GENERAL OPERATIONAL DESCRIPTION

1.6.1 Printing Capabilities

The Graphics Printer is capable of printing both upper and lower case letters, numbers, punctuation characters (ASCII characters 32-126), and 8-bit graphics data.

1.6.2 Connections

1.6.2.1 Graphics Printer-to-Mainframe

An interface cable (Dranetz P/N 113004) links up the Printer to the Mainframe. The DTE end of the interface cable connects to the Mainframe's DCE communications port (connector J2); the DCE end connects to the Graphics Printer's DTE communications port (connector J2). This connection scheme is illustrated in Figure 1-2 below.

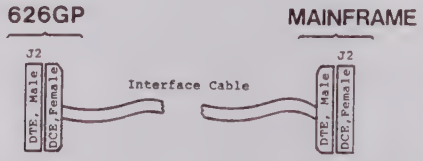


Figure 1-2. Graphics Printer-to-Mainframe

1.6.2.2 Graphics Printer-to-Remote Device

The Graphics Printer can also be connected to an RS-232C compatible remote device via an optional interface cable (Dranetz P/N 103506). The DCE end of the interface cable connects to the remote device's DTE communications port; the DTE end connects to the Graphics Printer's DCE communications port (connector J1). This connection scheme is illustrated in Figure 1-3 below.

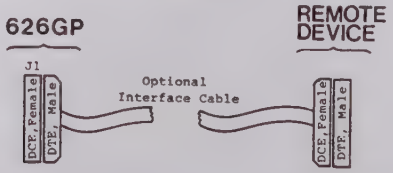


Figure 1-3. Graphics Printer-to-Remote Device

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

1.6.2.3 Power Cord Connection

The supplied power cord is a 3-pronged IEC male AC power cord (Belden P/N 17666). The female end plugs into the socket on the Graphics Printer's front panel; the male end plugs into any standard AC outlet and includes an extender socket on its end.

NOTE

The extender socket allows both power lines to be plugged into the same power source at operational requirement. If you are not using this extender socket, be sure that both plugs are connected to the same power source (by using a duplex outlet, power strip, etc.).

1.6.3 Switches and LED Indicators

(See Figure 1-4 for the front panel illustration of the printer.

There is a POWER ON/OFF switch, two PAPER STATUS LEDs (red for "out" and green for "OK"), and a PAPER FEED rocker switch on the front (top) panel.

When the POWER ON/OFF switch is turned on, one of the two LEDs will light, indicating the printer's paper status. If the green LED lights, the paper status is okay; if the red lights, the paper is out and must be replaced (refer to Subsection 2.2.1).

The PAPER FEED switch is used to advance the paper whenever a new roll is installed or when the Graphics Printer is not currently printing.

NOTE

This switch should NEVER be used while the unit is printing because it will affect the graphic printouts.

1.7 STANDARD ACCESSORIES

Part #	Quantity	Description
TM-113000-G1 Volume 1	1	Operator's manual
113004	1	Graphics Printer-to-Mainframe Interface Cable
110888	3	Thermal Paper
113020	2	Modified Flat-Top Keys
17666	1	Line Cord (Belden)

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

Figure 1-4. Typical Front (Top) Panel

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

1.7.1 Reordering Thermal Paper

Thermal paper for the Graphics Printer may be reordered from:

Dranetz Technologies, Inc.
Attn: Order Entry
P.O. Box 4019
Edison, NJ 08818-4019
(201) 287-3680

You may also order thermal paper from your authorized Dranetz representative. Rolls of thermal paper are available under P.N. 110888C.

Note: Use of thermal paper other than P.N. 110888 is not recommended.

1.8 OPTIONAL ACCESSORIES

Part #	Quantity	Description
TM-113000-G1 Volume 2	1	Service/Maintenance manual
103506	1	Interface Cable for Remote Devices

You may receive the Volume 2 manual by completely filling out and returning the Control Sheet in your Series 626 Operating manual.

1.9 FACTORY REPAIR

When factory repair is required, proceed as follows:

1. Contact the Dranetz Service Corporation (formerly Dranetz Technologies, Inc., Customer Service Department in order to obtain an authorization number for factory repair.

   Telephone No: (201) 755-7081 Telex: 499-7808

   TWX: (710) 997-9553 Cable: DRANET7

2. Fill out the REPAIR/SERVICE ORDER form enclosed in the Series 626 Operating manual. Ship it along with the malfunctioning equipment to the Dranetz Service Corp.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

SECTION II
INSTALLATION AND OPERATION

2.1 GENERAL

This section contains the installation and operating instructions for the Graphics Printer.

2.2 INSTALLATION

The Graphics Printer is specially encased in a modified Series 626 Mainframe cover. To install the Graphics Printer:

(1) Remove the Mainframe's front cover to reveal the Graphics Printer.

NOTE

Replace your existing key switch keys (if using the standard keys) with the modified flat-top keys (P/N 113020) which are designed for use in the Mainframe when the Graphics Printer is added.

(2) Place the Graphics Printer, facing up, either on top (as illustrated in Figure 1-1) or alongside the Mainframe.

(3) Attach the female end of the power cord to the 3-pronged connector on the Printer labeled "115 VOLTS 15 WATTS."

(4) Attach the DCE end of the interface cable (Dranetz P/N 113004) to the DTE port (connector J2) on the printer; attach the DTE end to the DCE communications port (connector J2) on the Mainframe.

If using a remote device such as a terminal or teletypewriter:

(5) Attach the DTE end of the optional interface cable (Dranetz P/N 103506) to the DCE port (connector J1) on the Graphics Printer; attach the DCE end to the DTE port on the remote device.

2.2.1 Installation of Thermal Paper

Whenever thermal paper requires replacement, the Printer's front panel red LED will light and the Mainframe's printer will automatically switch on and print the message "RS-232 LOST" on its own paper tape. All text (without graphics) will continue to be printed by the Mainframe's printer until the paper is replaced.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

Replace the thermal paper as follows:

(1) Turn off the printer. Lift up the printer door by pushing on its rear that will expose the paper roll.

(2) Remove the empty paper roll from its rest by lifting it upwards.

(3) Slide the empty roll off the spindle.

(4) Remove any remaining paper from the printer.

(5) Remove the holding tab from a new roll of paper.

(6) Using scissors, cut a straight edge across the beginning of the paper.

(7) Slide the new roll onto the spindle.

(8) Insert the spindle with the new roll into the U-shaped slots on the hinged door. Note: The paper should feed from the bottom of the roll, not the top.

(9) Turn on the printer. Feed the paper above the inner guard rest and between the small backwards C-shaped paper-out sensor on the right-hand side of the printer. (The red LED will go out and the green LED will light.)

(10) Feed the paper about a 4 inch into the paper feed slot and depress the PAPER FEED switch until the new paper comes into view.

(11) Close the printer door while making sure the paper does not get caught.

2.3 OPERATION

Turn on the POWER ON/OFF switch and check the paper status LED. If the red LED is lit, install a new roll of thermal paper (see Subsection 2.2.1). If the green LED is lit, press the black 'PRINT' push button on the Series 626 Mainframe. The Mainframe's printer should display "PRINTER OFF" (it is now disabled).

NOTE

Under normal operation, you will usually want the Mainframe's printer disabled, since its display is repetitive. If you do not, press the 'PRINT' push button once more and the Mainframe's printer will display "PRINTER ON" (it is now enabled).

The Graphics Printer is now ready.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

2.3.1 Sample Printout

Below is an actual printout from a Graphics Printer using input from a 626-PA-6030 3Ø AC Graphics Monitor plug-in. Descriptive information includes a multi-cycle waveform graph which pictorially describes the ac sine wave before, during, and after the disturbance. In addition, the disturbance is described alphanumerically by amplitude, duration, disturbance type, and time of occurrence.

Figure 2-1 illustrates a display of a 289 volt impulse which lasted 9 microseconds. (The impulse is near the center of the display.) The impulse occurred on channel 3, was a Phase A impulse, and occurred at 13:39:38.95 (1:39 PM).

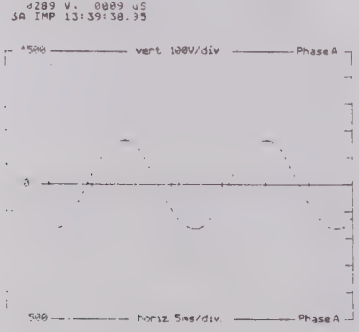


Figure 2-1. Sample Graphics Printer Display

2.3.2 In Case of Power Outage

If the ac power to the Graphics Printer is cut off at any time, the printer's own internal Uninterruptable Power Supply (UPS) will immediately take over. The UPS will allow the printer to operate, as normal, for at least 10 minutes.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

SECTION III
OPERATIONAL TEST

3.1 GENERAL

There is no operational test required for the Graphics Printer. If either the green or red LED doesn't light, or if the printer is operating erratically:

First, check your power source to be sure that it is operating.

Next, check all connections to and from the Graphics Printer to be sure that they are secure.

Next, check the Series 626 Mainframe's baud rate to be sure that it is set for 1200. (The Mainframe's baud rate must match the Graphics Printer's baud rate.)

If none of these steps solves the problem, refer to Subsection 1.9 for the factory repair procedure.

Also, if the Graphics Printer appears to be printing fuzzy or distorted characters, the printing head may require cleaning. Contact Dranetz Service Corporation for servicing instructions (refer to Subsection 1.9).

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

626GP Manual for 230V Operation

WARNING

Because of possible shock or fire hazards, connection of this instrument should be performed in compliance with the National Electric Code (ANSI C1) or any other requirements, or both, which may be applicable to the user.

Installation, operation, and maintenance should only be performed by qualified personnel.

TM-113000-G2

VOLUME 1 -- OPERATOR'S MANUAL

MODEL 626GP

GRAPHICS PRINTER FOR THE SERIES 626

1 May 1986

See opposite side relative to proprietary rights.

Note: Refer to Volume 2 (Service Manual) of TM-113000-G2 for the maintenance information.

© Copyright 1986
Dranetz Technologies, Inc.
All Rights Reserved.

DRANETZ

DRANETZ TECHNOLOGIES, INC.
1000 New Durham Rd., PO Box 4019
Edison, New Jersey 08818-4019

NOTICE OF ASSIGNMENT OF PROPRIETARY RIGHTS

This publication contains information proprietary to Dranetz Technologies, Inc. By accepting and using this manual, the user agrees that the information contained herein will be used solely for the purpose of repairing or operating equipment of Dranetz Technologies, Inc. These manuals are to be returned to Dranetz Technologies, Inc. when no longer required by the user, or when there is a change in ownership of the equipment.

These publications are protected under the Copyright laws of the United States Title 17 et seq. No part of this publication may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language or computer language, in any form, by any means, electronic, mechanical, magnetic, optical, chemical, manual, or otherwise, without the prior written permission of Dranetz Technologies, Inc., 1000 New Durham Road, P.O. Box 4019, Edison, New Jersey 08818-4019.

Table of Contents (Page 1 of 2)

Section		Page
I	**GENERAL INFORMATION**	1-1
	Subsection	
	1.1 SCOPE	1-1
	1.2 INTRODUCTION	1-1
	1.3 APPLICATION AND PURPOSE	1-1
	1.4 PHYSICAL DESCRIPTION	1-1
	1.5 TECHNICAL SPECIFICATIONS	1-2
	1.6 GENERAL OPERATIONAL DESCRIPTION	1-3
	1.6.1 Printing Capabilities	1-3
	1.6.2 Connections	1-3
	1.6.2.1 Graphics Printer-to-Mainframe	1-3
	1.6.2.2 Graphics Printer-to-Remote Device	1-3
	1.6.2.3 Power Cord Connection	1-4
	1.6.3 Switches and LED Indicators	1-4
	1.7 STANDARD ACCESSORIES	1-4
	1.7.1 Reordering Thermal Paper	1-6
	1.8 OPTIONAL ACCESSORIES	1-6
	1.9 FACTORY REPAIR	1-6
II	**INSTALLATION AND OPERATION**	2-1
	Subsection	
	2.1 GENERAL	2-1
	2.2 INSTALLATION	2-1
	2.2.1 Installation of Thermal Paper	2-1
	2.3 OPERATION	2-2
	2.3.1 Sample Printout	2-3
	2.3.2 In Case of Power Outage	2-3
III	**OPERATIONAL TEST**	3-1
	Subsection	
	3.1 GENERAL	3-1

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

Table of Contents (Page 2 of 2)

List of Tables

Table		Page
[illegible]	Technical Specifications	1-2

List of Illustrations

Figure		Page
[illegible]	Series 626 Mainframe with Graphics Printer	1-0
[illegible]	Graphics Printer-to-Mainframe	[illegible]
[illegible]	Graphics Printer-to-Remote Device	[illegible]
[illegible]	Typical Front (Top) Panel	[illegible]
[illegible]	Sample Graphics Printer Display	2-3

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

STATEMENT OF WARRANTY

ALL PRODUCTS OF DRANETZ TECHNOLOGIES, INC. ARE WARRANTED TO THE ORIGINAL PURCHASER AGAINST DEFECTIVE MATERIAL AND WORKMANSHIP FOR A PERIOD OF ONE YEAR FROM THE DATE OF DELIVERY. DRANETZ WILL REPAIR OR REPLACE, AT ITS OPTION, ALL DEFECTIVE EQUIPMENT RETURNED, FREIGHT PREPAID, DURING THE WARRANTY PERIOD, WITHOUT CHARGE FOR REPAIR, PROVIDED THERE IS NO EVIDENCE THAT THE EQUIPMENT HAS BEEN MISHANDLED OR ABUSED. THIS WARRANTY SHALL NOT APPLY TO ANY DEFECTS RESULTING FROM IMPROPER OR INADEQUATE MAINTENANCE, BUYER-SUPPLIED HARDWARE/SOFTWARE OR INTERFACING, UNAUTHORIZED MODIFICATION OR MISUSE OF THE EQUIPMENT, OPERATION OUTSIDE OF THE ENVIRONMENTAL SPECIFICATIONS FOR THE PRODUCT, OR IMPROPER SITE PREPARATION OR MAINTENANCE.

The information in this manual has been reviewed and is believed to be entirely reliable. No responsibility, however, is assumed for any inaccuracies. The material in this manual is for information purposes only, and is subject to change without notice.

Figure 1-1. Series 626 Mainframe with Graphics Printer

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

VOLUME 1
OPERATOR'S MANUAL

MODEL 626GP GRAPHICS PRINTER FOR THE SERIES 626

SECTION I
GENERAL INFORMATION

1.1 SCOPE

The manual for this product consists of two volumes. Volume 1, the Operator's manual, is divided into three sections: (I) GENERAL INFORMATION, (II) INSTALLATION AND OPERATION, and (III) OPERATIONAL TEST. Volume 2, the Service manual, contains the maintenance instructions and consists of four sections, IV through VII. (See Volume 2 for a description of these sections.)

1.2 INTRODUCTION

Volume 1 of this manual provides Operator's instructions for the Model 626GP Graphics Printer. (It will also be referred to in this manual as simply the "Graphics Printer.")

The Graphics Printer is designed for use with any Series 626 plug-in whose output can be graphically displayed.

1.3 APPLICATION AND PURPOSE

The Graphics Printer is a thermal printer designed for printing alphanumeric text and graphics data for applicable Series 626 plug-ins. The printer receives graphics and text information from a plug-in and then prints the graph. This graphic presentation of data is often easier to understand and to use when explaining environmental disturbances.

1.4 PHYSICAL DESCRIPTION

(See Figure 1-1 on the facing page for a Graphics Printer sitting on top of a Series 626 Mainframe.)

The Graphics Printer is specially encased in a modified Series 626 Mainframe cover for ease of transport and storage. The printer's J2 connector attaches to connector J2 on the rear panel of the Mainframe via an interface cable. The Graphics Printer can also be connected to an RS-232C compatible remote CRT terminal or teletypewriter during Series 626 remote control. This is done using an optional interface cable connected between the printer's J1 connector and remote device. The Graphics Printer is equipped with an internal Uninterruptable Power Supply (UPS) allowing it to operate for at least 10 minutes during a power outage.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

1.5 TECHNICAL SPECIFICATIONS

The technical specifications for the Graphics Printer are listed in Table 1-1 below.

Table 1-1. Technical Specifications

PRINTER

A. Type: Thermal Printer

B. Direction: Bidirectional Logic Seek, Text & Graphics

C. Dots per line: 320

D. Character Format: 5-by-7 in a 7-by-8 Cell

E. Dot Size: 0.28-by-0.28 mm (Height-by-Width)

F. Printing Width: 89.6 mm

G. Thermal Paper Width: 112 mm
Thermal Paper Thickness: 66 um

H. Environmental Specifications:
Operating Temp: +10° to +40°C (50° to +104°F)
Storage Temp: -20° to +55°C (-4° to +131°F)
Humidity: 10% to 90% (non-condensing)

I. Power Requirements:
180 to 264 V rms at 47-440 Hz, 15W nom., 1.2A

J. Dimensions (approx.):
11 1/2" wide by 7 1/2" deep by 3" high
(292 by 190 by 76 mm)

K. Weight (approx.): 4 lbs 1.8 kgs

PRINTER COMMUNICATIONS PORT (J2)

A. Type: RS-232C Compatible (DTE Connector, J2)

B. Connection: To the Series 626 Mainframe's Communications Port (DCE Connector, J2) via an Interface Cable

C. Baud Rate: 1200

PRINTER REMOTE COMMUNICATIONS PORT (J1)

A. Type: RS-232C Compatible (DCE Connector, J1)

B. Connection: To a Remote Device's Communications Port (DTE connector) via an Interface Cable

C. Baud Rate: 1200

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

1.6 GENERAL OPERATIONAL DESCRIPTION

1.6.1 Printing Capabilities

The Graphics Printer is capable of printing both upper and lower case letters, numbers, punctuation characters (ASCII characters 32-126), and 8-bit graphics data.

1.6.2 Connections

1.6.2.1 Graphics Printer-to-Mainframe

An interface cable (Dranetz P/N 113004) links up the Printer to the Mainframe. The DTE end of the interface cable connects to the Mainframe's DCE communications port (connector J2); the DCE end connects to the Graphics Printer's DTE communications port (connector J2). This connection scheme is illustrated in Figure 1-2 below.

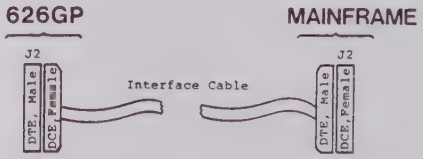


Figure 1-2. Graphics Printer-to-Mainframe

1.6.2.2 Graphics Printer-to-Remote Device

The Graphics Printer can also be connected to an RS-232C compatible remote device via an optional interface cable (Dranetz P/N 103506). The DCE end of the interface cable connects to the remote device's DTE communications port; the DTE end connects to the Graphics Printer's DCE communications port (connector J1). This connection scheme is illustrated in Figure 1-3 below.

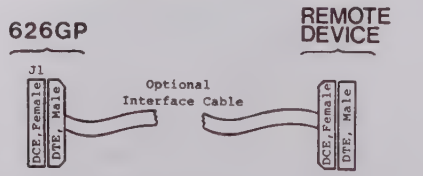


Figure 1-3. Graphics Printer-to-Remote Device

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

1.6.2.3 Power Cord Connection

The supplied power cord is a three-wire grounding unit with a three-prong plug at one end. The female end plugs into the power receptacle on the graphics printer. Make sure the male end plugs into an ac outlet configured for 210V operation.

NOTE

Both [illegible] must be connected to the same power source. To avoid a ground loop, power strip, etc., to allow proper operation of the Graphics Printer.

1.6.3 Switches and LED Indicators

[illegible] on the front panel [illustration of the printer.]

There is a POWER ON/OFF switch, two amber STATUS LEDs (one for [illegible] and another for "ON"), and a PAPER FEED rocker switch on the front (top) panel.

When the POWER ON/OFF switch is turned on, one of the red LEDs will light, indicating the printer's paper status. If the green ON lights, the paper status is okay; if the red lights, the paper is out and must be replaced (refer to Subsection 3.6.3).

The PAPER FEED switch is used to advance the paper whenever a new roll is installed or when the Graphics Printer is not correctly printing.

NOTE

This switch should NEVER be used while the unit is printing because it will affect the graphic printouts.

1.7 STANDARD ACCESSORIES

Part #	Quantity	Description
TM-113000-G2 Volume 1	1	Operator's manual
113004	1	Graphics Printer-to-Mainframe Interface Cable
110888	3	Thermal Paper
113020	2	Modified Flat-Top Keys
110726	1	Line Cord

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

Figure 1-4. Typical Front (Top) Panel

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

1.7.1 Reordering Thermal Paper

Thermal paper for the Graphics Printer may be ordered from:

Dranetz Technologies, Inc.
Attn: Order Entry
P.O. Box 4019
Edison, NJ 08818-4019
(201) 287-1680

You may also order thermal paper from your authorized Dranetz representative. Rolls of 112 feet are available under P.N. 113888G.

NOTE: Use of thermal paper other than P/N 113888 is not recommended.

1.8 OPTIONAL ACCESSORIES

Part #	Quantity	Description
[illegible]	[illegible]	[illegible]
103506	1	Interface Cable for Remote Devices

[illegible] the Volume 2 manual is completely filling out and returning the Control Sheet in your Series 616 Operating manual.

1.9 FACTORY REPAIR

[illegible] factory repair is required, proceed as follows:

1. Contact the Dranetz Service Corporation (formerly Dranetz Technologies, Inc.) Customer Service Department by phone to obtain an authorization number for factory repair.

   Telephone No: (201) 287-1680 Telex: 499-7808

   TWX: (710) 997-9553 Cable: DRANETZ

2. Fill out the REPAIR SERVICE ORDER form enclosed in the Series 616 operating manual. Ship it along with the malfunctioning instrument to the Dranetz Service Corp.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

SECTION II
INSTALLATION AND OPERATION

2.1 GENERAL

This section contains the installation and operating instructions for the Graphics Printer.

2.2 INSTALLATION

The Graphics Printer is specially encased in a modified Series 626 Mainframe cover. To install the Graphics Printer:

(1) Remove the Mainframe's front cover to reveal the Graphics Printer.

NOTE

Replace your existing key switch keys (if using the standard keys) with the modified flat-top keys (P/N 113020) which are designed for use in the Mainframe when the Graphics Printer is added.

(2) Place the Graphics Printer, facing up, either on top (as illustrated in Figure 1-1) or alongside the Mainframe.

(3) Attach the female end of the power cord to the 3-pronged connector on the Printer labeled "230 VOLTS 15 WATTS."

(4) Attach the DCE end of the interface cable (Dranetz P/N 113004) to the DTE port (connector J2) on the printer; attach the DTE end to the DCE communications port (connector J2) on the Mainframe.

If using a remote device such as a terminal or teletypewriter:

(5) Attach the DTE end of the optional interface cable (Dranetz P/N 103506) to the DCE port (connector J1) on the Graphics Printer; attach the DCE end to the DTE port on the remote device.

2.2.1 Installation of Thermal Paper

Whenever thermal paper requires replacement, the Printer's front panel red LED will light and the Mainframe's printer will automatically switch on and print the message "RS-232 LOST" on its own paper tape. All text (without graphics) will continue to be printed by the Mainframe's printer until the paper is replaced.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

Replace the thermal paper as follows:

(1) Turn off the printer. Lift up the printer door by pushing on its top; this will expose the paper roll.

(2) Remove the empty paper roll from its rest by lifting it upwards.

(3) Slide the empty roll off the spindle.

(4) Remove any remaining paper from the printer.

(5) Remove the holding tab from a new roll of paper.

(6) Using scissors, cut a straight edge across the beginning of the paper.

(7) Slide the new roll onto the spindle.

(8) Insert the spindle with the new roll into the U-shaped slots on the hinged door. (Note: The paper should feed from the bottom of the roll, not the top.)

(9) Turn on the printer. Feed the paper above the inner guard rest and between the small backwards C-shaped paper-out sensor on the right-hand side of the printer. (The red LED will go out and the green LED will light.)

(10) Feed the paper about a ¼ inch into the paper feed slot and depress the PAPER FEED switch until the new paper comes into view.

(11) Close the printer door while making sure the paper does not get caught.

2.3 OPERATION

Turn on the POWER ON/OFF switch and check the paper status LED. If the red LED is lit, install a new roll of thermal paper (see Subsection 2.2.1). If the green LED is lit, press the black [PRINT] push button on the Series 626 Mainframe. The Mainframe's printer should display "PRINTER OFF" (it is now disabled).

NOTE

Under normal operation, you will usually want the Mainframe's printer disabled, since its display is repetitive. If you do not, press the [PRINT] push button once more and the Mainframe's printer will display "PRINTER ON" (it is now enabled).

The Graphics Printer is now ready.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

2.3.1 Sample Printout

Below is an actual printout from a Graphics Printer using input from a 626-PA-6030 3Ø AC Graphics Monitor plug-in. Descriptive information includes a multi-cycle waveform graph which pictorially describes the ac sine wave before, during, and after the disturbance. In addition, the disturbance is described alphanumerically by amplitude, duration, disturbance type, and time of occurrence.

Figure 2-1 illustrates a display of a 289 volt impulse which lasted 9 microseconds. (The impulse is near the center of the display.) The impulse occurred on channel 3, was a Phase A impulse, and occurred at 13:39:38.95 (1:39 PM).

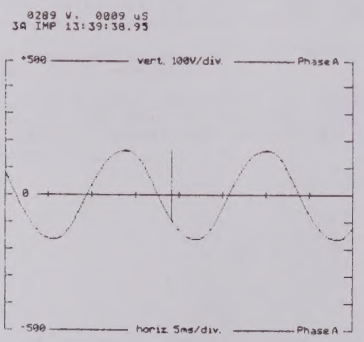


Figure 2-1. Sample Graphics Printer Display

2.3.2 In Case of Power Outage

If the ac power to the Graphics Printer is cut off at any time, the printer's own internal Uninterruptable Power Supply (UPS) will immediately take over. The UPS will allow the printer to operate, as normal, for at least 10 minutes.

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.

SECTION III
OPERATIONAL TEST

3.1 GENERAL

There is no operational test required for the Graphics Printer. If either the green or red LED doesn't light, or if the printer is operating erratically:

First, check your power source to be sure that it is operating.

Next, check all connections to and from the Graphics Printer to be sure that they are secure.

Next, check the Series 626 Mainframe's baud rate to be sure that it is set for 1200. (The Mainframe's baud rate must match the Graphics Printer's baud rate.)

If none of these steps solves the problem, refer to Subsection 1.9 for the factory repair procedure.

Also, if the Graphics Printer appears to be printing fuzzy or distorted characters, the printing head may require cleaning. Contact Dranetz Service Corporation for servicing instructions (refer to Subsection 1.9).

Copyright © 1986
Dranetz Technologies, Inc.
All Rights Reserved.